University of Alberta

Visual tools for children's online reading clubs: Facilitating interaction, collaboration and dialogue

by

María Constanza Pacher

A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the
requirements for the degree of *Master of Design*

in

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Visual tools for children's online reading clubs: Facilitating interaction, collaboration and dialogue

A PRELIMINARY STUDY USING A PAPER PROTOTYPE

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Visual Communication Design
Master's Thesis Project
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FALL, 2004

To my parents, to whom I am grateful

for a childhood filled with books

Abstract

Learning to enjoy reading is essential for a child's development and future success. Attracting children to read can be a challenge when computers and interactive games distract the young audience from books. This work presents the findings of an interdisciplinary project conducted by a visual communication designer, which involved the researching of issues for the creation of an online reading club intended to attract children to read in interactive and collaborative ways. A set of visual tools was designed to help children perceive the presence of others and to identify opportunities for interaction in an online environment where communication is usually text-based. A paper prototype was tested with 23 children, in grades five and six, in an activity that simulated an online group discussion about literature. Contextual observation and participatory design methods were implemented in this evaluation. The analysis of children's use of tools, discussion dynamics, dialogues, responses and motivational aspects indicated that the use of visual tools might facilitate interaction, collaboration and dialogue in online media. Some limitations in the study would require further research, such as testing with novice computer users and the inclusion of a moderator. Recommendations for the design of an online reading club are presented.

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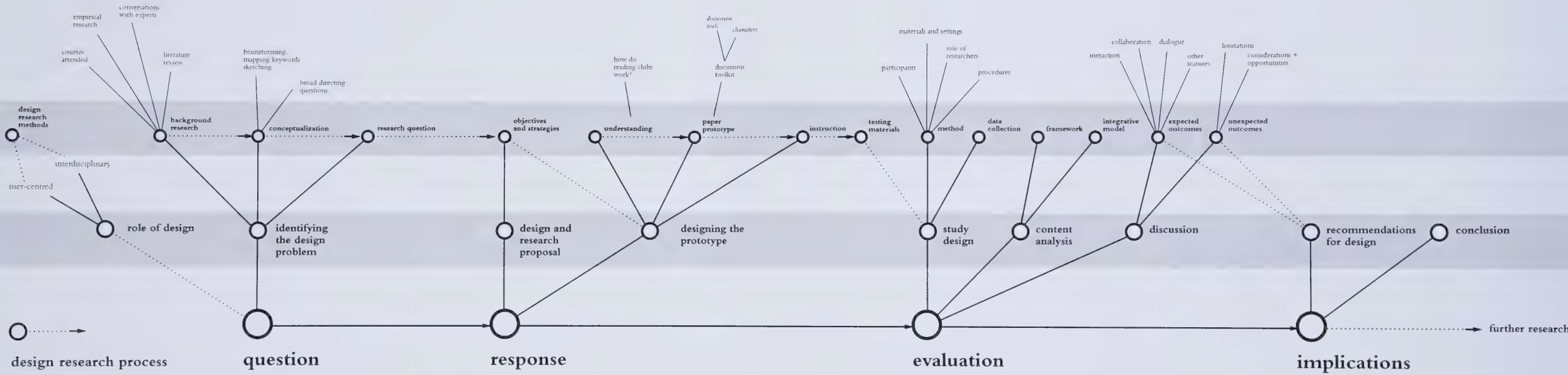
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Design question

INTRODUCTION

The purpose of this project was to explore issues involved in the design of interactive educational materials. Through the researching of issues regarding the creation of an online reading club for children, and the design of visual tools aimed at facilitating the interaction with others in a virtual environment, this project has the potential to contribute to the teaching of reading in elementary schools.

This master's thesis project was not intended to end with the creation of a product, but to open dialogues between disciplines towards the development of joint projects aimed at exploring ways of engaging children to read in interactive, collaborative and pleasurable ways.

Exploring the process behind the design action was of value to the researcher, offering new ways of understanding design research and practice. The practising and teaching of process is critical in design. Designing involves planning and the use of methods that help designers arrive at systematic and logical solutions. In the learning of process, students acquire the essential skills to continue to grow long after the end of school (Hyerle, 1996). The documentation of the process undertaken becomes important, enabling the designer to revisit the steps that led her to one of the possible solutions to the problem encountered, and making it possible to share her approach within the context of design practice and education.

The main purpose of this document is to make visible this process of planning, researching, understanding, developing and evaluating the design intervention.

Context

Visual communication designers work with the visual organization and display of information in order to improve people's lives. Whether it is a traffic sign, a medical pamphlet, a school textbook or a three-dimensional virtual space, designers work in collaboration with professionals in other disciplines and with the user to create visual systems intended to facilitate interactions and communications among people. According to Frascara (1997), the evolution of the design discipline from focusing purely on the design of objects to the design

of "processes, services, structures and systems" raised the need for interdisciplinary considerations that involve "social, cultural, economical, technical and environmental concerns" (p.3).

User-centered design

The design process needs to be user-centered, involving the user in all the design stages, from the conception of the project to post-evaluation of performances. Frascara (1997) defined the practice of visual communication design as "an activity directed at affecting the knowledge, the attitudes and the behaviour of people," stressing that the design process should be informed by the audience instead of arising from "presumed universal aesthetic paradigms or personal choices of the designer" (p.3). The designer becomes a researcher then, working in close collaboration with professionals from the social sciences, in the interpretation of the needs and desires of the audience. Sanders (2002) described participatory design methods used to learn about people and their experiences, such as listening to "what people say," watching, observing and interpreting "what people do and use," and uncovering "what people know" (p.3).

Interdisciplinary approach

In this context, the role of the designer in the development of instructional materials, has gone beyond the purely form-giving tasks to the exercise of a more critical role that requires knowledge and methods that reside outside the design discipline (Frascara, 2002). The interdisciplinary work with educators, educational psychologists and technologists, among others, becomes critical for the design of effective teaching aids. Research, planning and development must involve, from the early stages and throughout the process, children and educators who will help designers understand issues in greater depth, identify the real needs children and educators may have, foresee potential problems and create tools and content for specific purposes and goals.

Designing for children with children

Participatory design sessions where children can actively participate and freely express their needs and preferences are an asset to the design of effective and flexible learning spaces (Sadler Takach & Varnhagen, 2002; Druin & Solomon, 1996). By using an iterative design process, with collaborative sessions throughout the stages, designers avoid the risk of creating tools that constrain the learner's actions instead of helping him. During these hands-on sessions, and by observing children's interaction with tools, materials or scenarios, designers challenge their own assumptions, leaving room for the insights that come with the natural contributions of children. According to Plowman (1996), it is

essential to observe the designed materials in use, in order to evaluate their performance, a method that she called "contextual observation." The understanding of how children interact with information and peers becomes a valuable tool for the design of engaging learning environments that enable learners to find their own paths to knowledge (Druin & Solomon, 1996).

Process overview

The first stage in the design research process was the exploration of issues not pertaining to the field of visual communication design, but that were essential to the development of the project. Learning theories, the teaching of literature in elementary school and computer-supported instruction, were some of the areas explored that provided the approaches, methods and tools to start building bridges with the other disciplines.

Attending the course *Teaching Literature in the Elementary School* [1] was pivotal for this project for it focused the interest in promoting literacy, on the literature circles practice, collaborative learning and student-centered approaches. With this background, a small exploratory study was conducted as an introductory exercise to investigate design research methods[2]. The project involved the design of a paper prototype to represent an online reading club, and observing and interviewing one child regarding general aspects of the interface and the instructions for use. This informal study was encouraging, and provided preliminary understanding about how a child might navigate in a web environment, the importance of not underestimating a child's capabilities, and how a paper prototype could be useful in gathering a child's response to the structure and content of an interface.

Literature review

A preliminary review of the literature and research provided the background to begin dialogues with teachers, students in education, instructional designers and developers of instructional materials. These conversations—held throughout the stages of the process—helped in the final outcome, for they provided invaluable insights into teaching practices, instruction, content development and children's attitudes and behaviours. These conversations helped to situate the project in the "real world," and to shape it according to the needs that were emerging.

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1 EDEL 409; 2 DES 693

Conceptualizing Diagrams, mapping of keywords and preliminary sketches aided the conceptualization stage; these instruments helped clarify the research needs and the need for a visual communication design intervention (Figs. A, B in *foldout*). Broad directing questions were stated at the beginning of the thinking process:

- How can design contribute to education?
- How can education contribute to design?
- How can design help language arts teachers to foster literacy and to promote reading as a pleasurable experience?
- What kind of teaching aids can be created to attract children to reading?
- What could be borrowed from interactive games in which children are so interested?
- How can we attract children to reading in a playful, interactive and collaborative way?

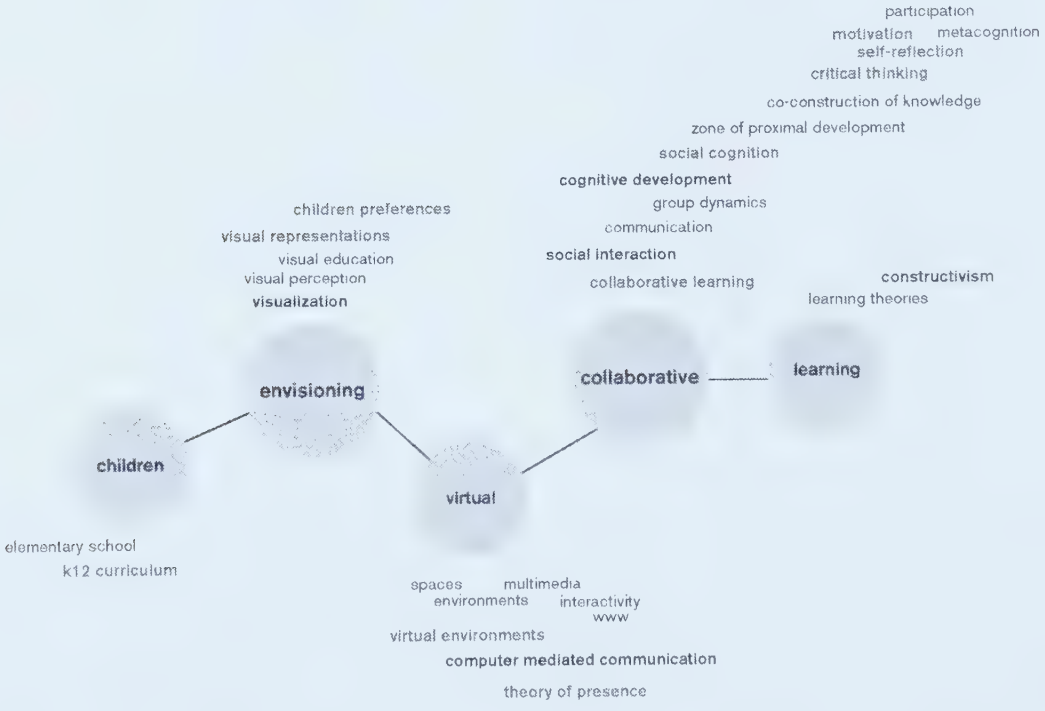


Fig. A Mapping keywords.

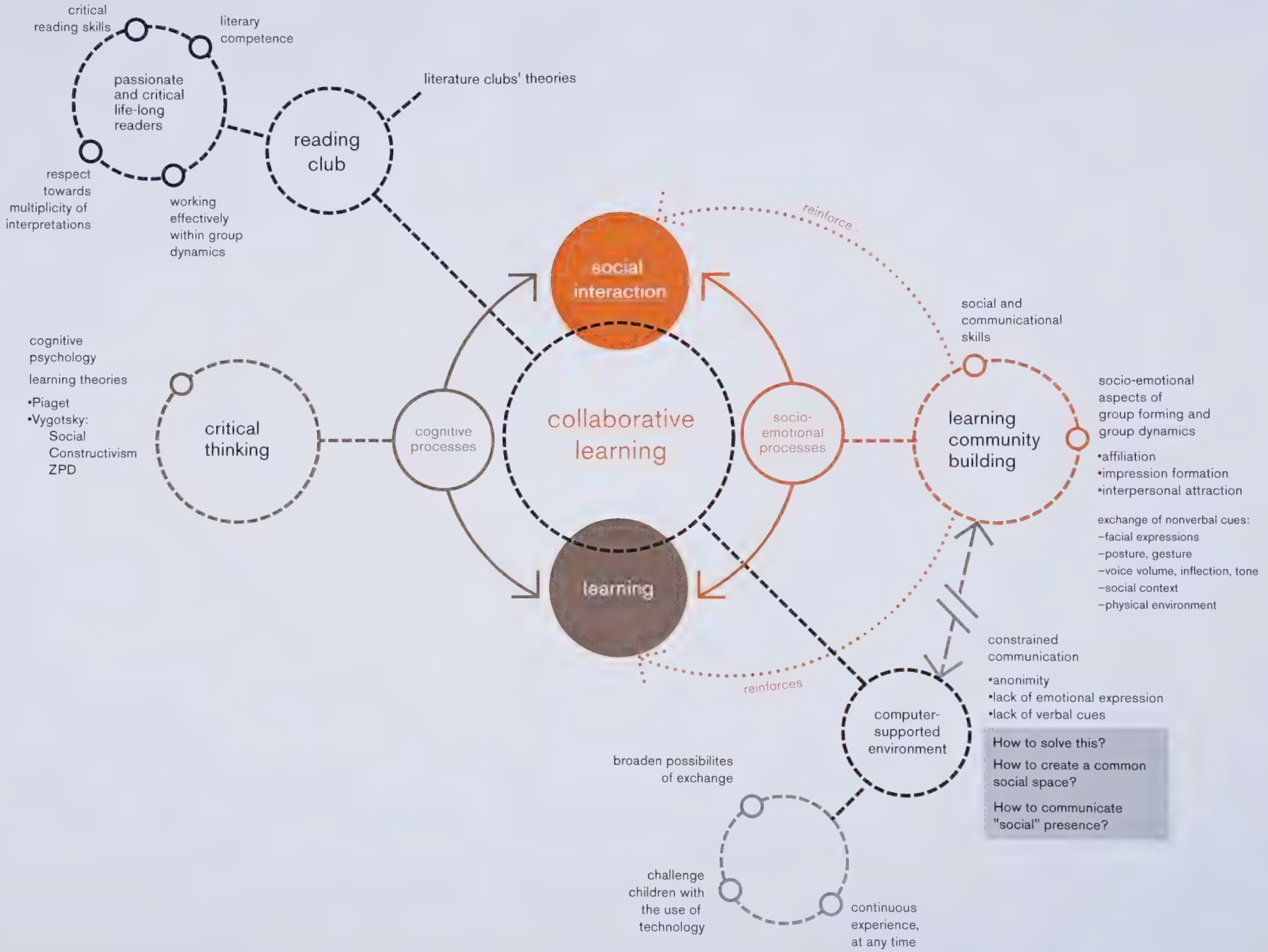


Fig. B Mapping the context for research.

Identifying the problem

Learning to read and to become a reader during the elementary school years is of vital importance for a child's development and future success. Language, being "the basis of all communication and the primary instrument of thought", helps define culture, personal identity and is essential as a social tool, helping the building of relationships and learning from others (Alberta Learning, 2000, p.1). Reading and writing are critical means of learning; language facilitates reflection and control over thinking and learning processes, in fact, according to Betthelheim and Zelan (1981), the experience of learning to read could determine children's conceptions of themselves as learners in general. Literacy provides children with the skills to acquire knowledge, to understand themselves, others and the world they live in, and to eventually become active participants and contributors to society as students, professionals and parents.

Louise Rosenblatt (1982), a pivotal figure in the field of literary education, suggested that literature is an "endangered species," and that "by establishing the habit of aesthetic evocation and personal response during the elementary years, teachers of children's literature can make a prime contribution to the health of our culture" (p.277).

Reading clubs

The way reading and literature are presented to children by teachers is a key factor in the process of fostering lifelong readers. The reading club model introduces children to reading within a social constructivist approach, forging critical readers who are able to construct their own meanings from texts, to share their insights with others, and to learn from the multiplicity of interpretations their peers bring to the discussions. In these collaborative spaces, children learn by doing, by working with texts they choose themselves, and by discussing with peers issues that are aligned with their own interests. The ultimate goals of the reading clubs are:

- to achieve literary competence;
- to develop critical thinking skills;
- to learn how to work effectively in group dynamics;
- to develop social and communicational skills; and
- to experience reading as a pleasurable and social experience.

However successful the reading club model may be, there are some limitations when it is implemented in the classroom, such as time constraints, effective ways of monitoring discussions, and performance assessment.

Motivation to read

Motivation to read is another major concern among teachers and parents, who recognize that many children do not read outside school activities. Attracting children to read becomes a challenge in a reality in which computers engage them in interactive and collaborative games that are more consistent with their interests, while distracting the young audience from books. Blair and Sanford (2003) researched the issues involved in the high percentage of boys' failure in Canadian schools because of their weaknesses in relation to reading practices. According to the researchers, "boys' personal interest in text is connected to the active, emotional, mental and physical engagement they experience," being highly important for them to "get into action" in relation to those texts (para. 7). Purposefulness drives these children's selection of reading material, whether it is to get information or to stay connected with friends. Navigating the Internet, accessing and reading information online and communicating via chat rooms are abilities that many of these children possess; skills that give shape to their own experiences of literacy (Blair & Sanford, 2003).

In this context, there is a need for the creation of new learning spaces where literature can be experienced in an active way, promoting the communication and sharing of interpretations with others as a valuable aspect of learning how to enjoy reading.

Interactive educational materials

Visual communication designers working in an interdisciplinary fashion with professionals in the fields of education, psychology and instructional design, among others, can make a significant contribution to the teaching of literature. The design of interactive educational materials is an area where visual communication designers can have enormous impact. Digital media has changed the nature of the design, display and retrieval of information, from static print formats to dynamic multi-layered spaces that could even evolve in time (Heller, 2001). "Nonlinear interaction requires complex navigation and orientation solutions, grounded in cognitive and perceptual psychology and information design" (McCoy, 2001, p.5). These new hierarchies and complexities require appropriate visual systems to display information in ways that are clear to children, so it facilitates their interaction with information, peers and teachers. The role of the designer becomes critical then, not only regarding the development of clear and appealing materials, but also in the research of new methods for the design of flexible, interactive and dynamic learning spaces that are aligned with children's interests and facilitate their active involvement and participation.

Considering the way computers are already integrated in children's lives, as a source of amusement, entertainment and information (Druin & Solomon, 1996), it is suggested that the use of computer-based instruction, in the form of an online reading club could succeed in engaging children to read. The sharing of literary interpretations through online dialogues with peers could attract children to reading activities in an active, playful and collaborative way, introducing literature as a powerful tool for making friends and as an enjoyable activity, and thus promoting the habit of reading.

Building bridges among children

The creation of a reading club online could open new channels of communication, connecting students, schools and communities worldwide. The reading club online could bring the pleasure of reading and sharing with others, to children that are in hospitals (Druin & Solomon, 1996), children with disabilities or those who live in remote places. It could open, for example, the possibility to collaborate in joint projects between a class at the Garneau School in Edmonton and a class at a school in a small native community in the Northwest Territories, building not only geographic but cross-cultural bridges.

Distance education

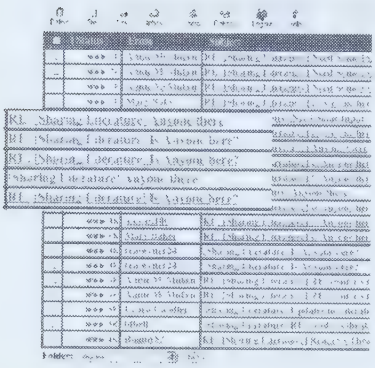
The technological advances that Alberta is experiencing in relation to broadband, high-speed communication networks will soon make accessible the resources needed for e-learning to be possible, even in remote places. The *Alberta SuperNet* project will link government offices, schools, health-care facilities and libraries, including 4,700 connections in 422 communities[3], which could facilitate the implementation of reading clubs in distance education, enhancing the teaching of language arts in online environments.

Social interaction online

The effectiveness of these online collaborative learning spaces depends on social interaction, a factor that may be hampered by the text-based nature of this form of communication. Within face-to-face reading clubs, children share the same physical space; verbal communication is aided by non-verbal cues such as facial expression, gesture, voice volume, inflection and tone. When the interaction is online, spoken language is replaced by written language, the discussion becomes silent, and partners in dialogue are located in remote places. The lack of social presence in the online medium appears not to facilitate the richness and complexity of discussion processes found in the face-to-face experience. Interrelationships among participants, nature of responses, flow of

3 Retrieved from http://www.albertasupernet.ca/

dialogue and collaboration, cannot be shown in a text-based structure, nor the sense of individual and group presence needed for social interaction to occur (Figs. C, D).



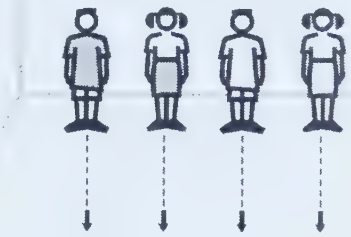


Fig. C (left) It is difficult to identify dialogues or interrelationships among participants within these linear text-based e-mail communication (www.webmail.ualberta.ca).
Fig. D (right) This illustration depicts the type of communication suggested by the series of non-interrelated messages.

If social interaction is not facilitated, the impossibility of forming dialogues could lead to a series of individual monologues and scattered contributions, failing to achieve the essential aspects of reading clubs:

- the interchange among peers;
- the sharing of experiences about reading;
- the awareness of multiplicity of interpretations; and
- the collaborative construction of meaning from texts.

Interaction collaboration and dialogue

It becomes essential, then, to provide these reading clubs online with the necessary elements to facilitate interaction among children, the building of dialogues about literature, and the possibility to collaborate in the construction of meanings (Fig. E).

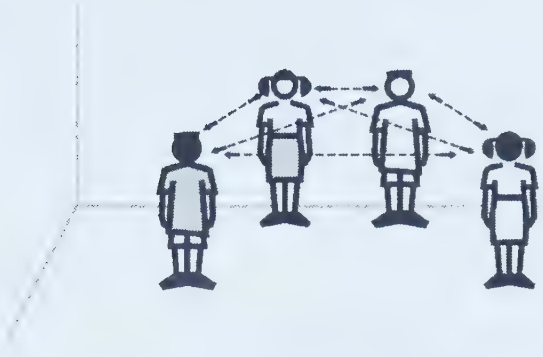


Fig. E In order to facilitate interaction it is essential to provide the tools that make the dialogues and interrelationships, visible.

Visual tools The use of visual tools could counterbalance the linearity of verbal language in the online medium, enabling the visualization of structures and interconnections that otherwise would remain hidden. The use of visual tools could help children to perceive the presence of others, to make sense of the discussions and to identify opportunities for interaction, motivating their active involvement and participation. These visual tools could depict the dynamic, organic and complex nature of children's discussions, in a way that creates a common social space able to facilitate *interaction*, *collaboration* and *dialogue*.

In this project, the term *visual tool* is used to describe the system of tools that helps children to visualize social presence, the nature of messages, shared ideas and threads of dialogue (Fig. F).

Research question

How can a visual tool for children's online reading clubs facilitate interaction, collaboration and dialogue?

Proposal The purpose of this project was to design a visual tool, intended to facilitate interaction, collaboration and dialogue in children's online reading clubs, with the ultimate goal of attracting and engaging children in reading while fostering literary competence. The proposition of using visual tools is based on three premises:

1. The use of diagrams allows the depiction of complex information and structures that cannot be represented in purely verbal-linear forms (Frascara, 2001).
2. The use of diagrams promotes reflection (Hyerle, 1996; Frascara, 2001).
3. The use of diagrams reveals relationships that may be hidden if not graphically exposed (Hyerle, 1996).

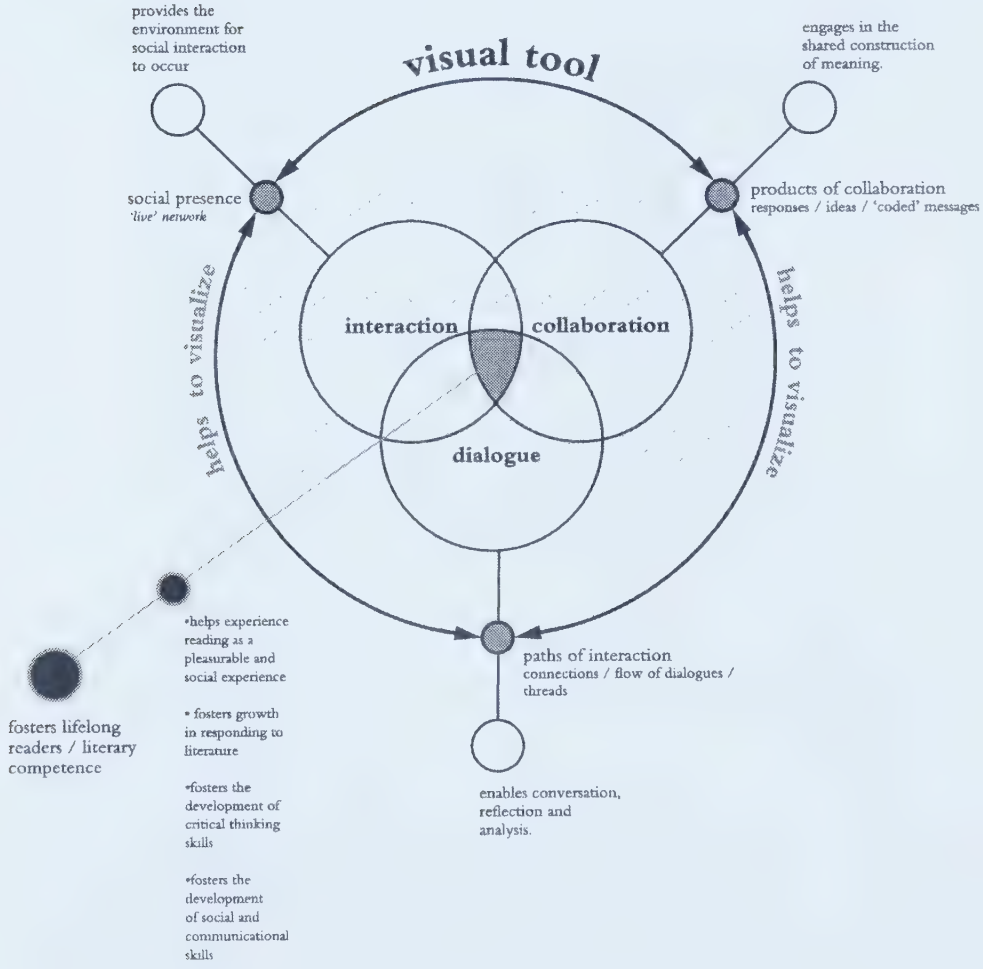


Fig. F The visual tool helps to visualize social presence, products of collaboration and paths of interaction in order to engage children to reading activities in playful and collaborative ways, while fostering literary competence.

Specific objectives

The specific objectives derive from the research question and relate directly to the three premises chosen in relation to visual tools. Objectives, strategies and outcomes are stated as follows:

1. INTERACTION

To provide an environment where social interaction is facilitated

The visual tool will help to visualize social presence and the live network of interconnected participants to:

- elicit awareness of social presence and provoke a response to it;
- foster the building of a literacy community and the sense of belonging to it; and
- motivate and inspire active involvement and participation.

2. COLLABORATION[4]

To engage children in the collaborative construction of meaning

The visual tool will help to visualize products of collaboration, responses and ideas to:

- encourage collaboration, peer support and scaffolding of ideas;
- encourage consciousness about the nature of responses; and
- encourage the articulation of complex responses.

3. DIALOGUE[4]

To enable conversation, reflection and analysis

The visual tool will help to visualize paths of interaction, connections and threads of dialogue to:

- foster the development of communicational skills;
- encourage the 'active' listening to other's ideas;
- foster the appreciation of multiple interpretations of a text; and
- promote reflection about their own and other's contributions.

Broad objectives

The following broad objectives relate to general advantages that the creation of an online reading club could bring to the classroom and the teaching of literature:

4 Objectives and strategies based on Spiegel (1998) and Bainbridge, Coleman and Gellner (2004)

- to foster literacy competence and the experiencing of reading as an enjoyable experience;
- to motivate and attract children to reading;
- to broaden the possibilities of communication with children from other schools, communities and cultures;
- to enable the implementation of reading clubs in online distance education;
- to present literacy as a powerful tool for communication and dialogue;
- to enable children to have a space for the continuous experience of literature, providing a solution to the problem of time constraints;
- to become an extension of classroom activities, such as group homework, long term readings and summer activities;
- to enable simultaneous participation;
- to enable the collection of data produced in the discussion for posterior analysis by teachers and/or students;
- to provide teachers with a tool for monitoring discussions and performance assessment; and
- to provide students with a tool for group class presentation.

Study design This stage involved the definition of methods, the participants and the activities, as well as receiving the necessary ethics approvals to conduct research with children.

Audience The decision concerning the age of the participants involved in the testing activities was based on Piaget's stages of cognitive development. According to Kail (1998), ten- and eleven-year old children are capable of applying "mental operations to abstract entities, allowing them to think hypothetically and reason deductively" (p.151). Metacognitive skills are also already developed in this age group, which enable children to self-reflect about their learning and thinking processes.

Children and adolescents in this stage have more social interactions with friends and classmates, which enables the understanding of different perspectives and opinions in relation to problems, topics and events.

Regarding the development of self-concept, ten- and eleven year olds describe themselves in relation to the social groups to which they belong, their emotions and their skills in comparison with peers. This peer comparison is

connected to the development of self-esteem, and relate to possessions, appearance, scholastic performance and athletic competence, among others (Kail, 1998).

Designing the prototype

Regarding design aspects, the first important decision made was the use of a paper prototype for the testing, as part of the process for designing a website. Although the development of a fully functional website was outside the scope of this thesis, the real interest in this project was to find out how children communicated within the environment created and their use of the tools designed for that purpose. The use of a paper prototype removed the technology aspect, making it easier to focus on the relevant aspects of the study.

In order to equip the participants with the elements needed to engage in silent dialogues within the simulated online medium, a set of tools was created and contained in a *discussion toolkit:*

- *discussion tools* to code messages, and
- *characters* to identify the participants during the discussion.

In addition, notepads to write messages, markers to connect with others and a *discussion space* (foam core board) were provided.

The instruction (selection of reading material, writing of questions and overall activity) and several prototypes were designed in a process that involved getting feedback from professionals in visual communication design, education and educational psychology.

Data collection and analysis

The testing of the prototype was performed in three sessions, involving the following methods:

- silent discussion activity;
- answering a questionnaire;
- participatory design activity; and
- group conversation.

Five types of raw data were collected during the testing:

1) field notes;
2) questionnaire responses;
3) photographs and voice recordings;
4) discussion boards; and
5) rapid low-tech prototypes.

The analysis of the data collected consisted of:

- preliminary organization of material, observation and finding of patterns;
- creation of a framework for the analysis;
- coding, sorting and organizing five different types of raw data into workable texts and images; and
- creation of an integrative model for comparison and integration of data.

In order to identify if the expected outcomes had been met, the data collected was organized according to the framework created, in which the research question had been broken down into its three main components: interaction, collaboration and dialogue.

Discussion

Overall performance

The paper prototype was a valuable tool in the process of designing the website. It permitted the observation of children working with the tools provided, and how these tools worked in the facilitation of interaction among peers and discussion procedures. By writing, posting and reading messages, children engaged in silent discussions with peers that simulated an online experience. Regarding overall aspects of the testing:

- children did not show any difficulties in the use of the discussion toolkit and discussion tools;
- discussion dynamics were performed as expected, by posting messages, connecting with others, building threads and starting new topics; and
- children showed enthusiasm regarding the activity and eagerness to participate. They expressed the view that it had been fun communicating by writing and making drawings.

Expected outcomes

According to the observations and analysis of the data collected, the visual tool appears to have met the specific expected outcomes. The findings, categorized in the performance of the visual tool regarding the facilitation of *interaction*, *collaboration* and *dialogue*, are stated as follows:

1. INTERACTION

The visual tool appears to provide an environment where social interaction is facilitated, for it:

- *facilitated children's interaction, elicited awareness of social presence and provoked a response to it;*
- *helped the building of the community and the sense of belonging; and*

- *motivated and inspired the active involvement and participation.*

Seeing the interrelationships and dialogues growing in the shape of a network that is in constant change helped children to see a group of people working actively and collaboratively. Children could see themselves and the others contributing to the dialogues, which motivated them to participate in enthusiastic discussions.

2. COLLABORATION

The visual tool appears to engage children in the collaborative construction of meaning, for it:

- *encouraged collaboration, peer support and scaffolding of ideas;*
- *enabled the articulation of complex responses; and*
- *encouraged consciousness about the nature of responses.*

Seeing the coded messages on the discussion board facilitated collaboration among children. Children could see the ideas exposed on the board, which helped them to identify opportunities for action and to link to other's ideas. The use of discussion tools helped children to structure their messages, slowing down the responding process and thus promoting the elaboration of thoughtful responses. The picture tool was useful in helping children to elaborate complex responses, and clarify their ideas prior to writing; it also appeared to be a valuable tool in enabling the participation of children of different cognitive abilities within the discussions.

3. DIALOGUE

The visual tool appears to enable conversation, reflection and analysis, for it:

- *helped the development of communicational skills;*
- *encouraged active listening to other's ideas;*
- *fostered the appreciation of multiple interpretations; and*
- *promoted reflection about their own and other's contributions.*

Seeing who is talking to whom, and the connections and threads of dialogues, helped children to engage in conversation. Children could see others *signaling* on the board aided by the discussion tools; this motivated them to build responses. Children read their peers' comments, reflected and responded. The possibility of working in simultaneity enabled the participation of all children, each one at his/her own pace.

Unexpected outcomes

The effectiveness of the silent discussion mediated by the paper prototype suggested that this activity and materials could be used in the classroom as an activity in itself, to:

- introduce children to discussion dynamics procedures;
- enable children of different cognitive abilities to participate in discussions;
- stimulate responses as an alternative to the oral discussion within face-to-face reading clubs; and
- train children in the dynamics of communication mediated by computers.

The visual discussions could be useful for analysis and reflection about group discussion, and as an aid for class presentation. The visual tool showed potential for use by teachers as a tool for performance assessment (see Figs. 99-100 in *foldout* p.112).

Some limitations in the study would require further research, such as:

- the testing of the prototype with children less skilled in the use of computers and communication online;
- the exploration in depth of privacy and security policies in online children's communities to ensure a safe space for interaction;
- the addition of *answer*, *end topic* and *summary* tools; and
- the implementation of a discussion moderator.

Implications for design

Recommendations for the design of an online reading club that facilitates interaction, collaboration and dialogue among children are stated in the last section of this document. These recommendations are based on the analysis of the data collected regarding the performance of the prototype, children's overall comments about the activity, tools and prototype, and the analysis of the rapid low-tech prototypes made by children during the participatory design session.

BACKGROUND RESEARCH

The practice of sharing stories is even older than the writing system itself, with every culture having its own history of storytelling and customs related to experiencing literature. Before Gutenberg's innovation, most books were produced by and for the church through an extremely time-consuming hand-written process resulting in luxurious and unaffordable objects; but even if people could have afforded buying a book, it would have been totally useless, for only a few people were capable of reading.

Nevertheless, literature existed and people experienced it through oral transmission. Jongleurs and troubadours spread stories in public places and royal courts, while the elders of other cultures gathered people around a fire who listened avidly to their stories. Later, when books became more popular, and other sources of amusement had not yet been invented, literature continued to be lived as a social experience.

With the advent of radio, television, cinema—and later videogames and computers—reading books became less attractive for a large number of people who found in the new media a faster source of entertainment.

Louise Rosenblatt's groundbreaking work shifted the focus in education from a teacher-centered to a student-centered approach. Her *transactional theory of reading* placed the reader as the most important player in the interpretation of texts. This new approach changed the practice of teaching reading, creating the need to build opportunities for children to share their individual interpretations with peers.

Reading clubs spontaneously emerged among people that wanted to share their readings and personal interpretations with others. It is suggested that the sense of belonging to a community of readers, not only motivates people to read more, but also makes reading a more meaningful and pleasurable experience (Fox & Wilkinson, 1997). In the 1980's literature circles began to be implemented in schools (Daniels, 2002), and nowadays literature circles, book clubs or reading clubs are a common practice.

Reading clubs

Theoretical framework

Reading clubs are collaborative learning environments where reading is experienced as a social activity. Aimed at fostering literacy among children, reading clubs succeed in attracting children to reading in an active, playful and

collaborative way. The interaction of children within these spaces helps them grow as readers, develop critical thinking skills and social and communicational skills essential for their adult lives (Daniels, 2002; Dawson & Fitzgerald, 1999; McMahon & Raphael, 1997; Fox & Wilkinson, 1997; Peterson & Eeds, 1990).

Reading clubs are widespread throughout schools and communities around the world. Constituting, in many cases, the core of the reading curriculum in elementary school, this collaborative learning model satisfies several learning outcomes stated in the English Language Arts K-9 curriculum (Alberta Learning, 2000).

Students will listen, speak, read, write, view and represent to:

- explore thoughts, ideas, feelings and experiences;
- comprehend and respond personally and critically to oral print and other media texts;
- manage ideas and information;
- enhance the clarity and artistry of communication; and
- respect, support and collaborate with others.

The specific learning outcomes that reading clubs foster are:

- to achieve literary competence;
- to develop critical thinking skills;
- to learn how to work effectively in group dynamics;
- to develop social and communicational skills; and
- to experience reading as a pleasurable and social experience

(Daniels, 2002; Dawson & Fitzgerald, 1999; McMahon & Raphael, 1997; Fox & Wilkinson, 1997; Peterson & Eeds, 1990).

The reading club model is based on two main theories: *social constructivism* (Vygotsky, 1930-1935/1978) and a *transactional theory of reading* (Rosenblatt, 1938/1976). Both determine a collaborative learning approach to teaching literature with a strong student-centered component.

Social constructivism

Piaget stated that the child actively participates in the learning process, deciding his own learning paths and hence constructing his own meanings and knowledge (Shaffer, 1999). Vygotsky questioned some of Piaget's postulates and introduced the importance of social interaction in the construction of new understandings in a theory known as social constructivism. Vygotsky also stated that a learner can accomplish higher goals with the guidance and encouragement of a more skilled partner, and stressed that scaffolding fosters cognitive growth;

this theory is known as *Zone of Proximal Development* (Shaffer, 1999). There is substantial evidence that Vygotsky's collaborative-learning approach is an effective educational strategy (Shaffer, 1999). Findings have shown that collaboration among students leads to "higher achievement, greater motivation to learn, more positive relationships among students, greater acceptance of differences, higher self-esteem..." (Johnson, Johnson & Johnson Holubec, 1988, p.iv). The achievement of cooperative skills becomes then vital to future career and life success.

Transactional theory of reading

Louise Rosenblatt developed the reader response school of literary criticism in 1938. Deeply rooted in constructivism, it was based on the concept that there is no one single interpretation of a text, on the contrary, each reader interprets a text according to his own literary experience, as well as his personal experience, history and background (Bainbridge & Pantaleo, 1999). Rosenblatt (1982) defined reading as "a transaction, a two-way process, involving a reader and a text at a particular time under particular circumstances" (p.268), generating what she called the *poem*, or meaning, as a result of the transaction.

Inspired by Rosenblatt, many other researchers have written about children as "meaning makers". McMahon and Raphael (1997), when setting the basis for their *Book Club Program*, adhered to Rosenblatt's ideas saying that the reader response theory "provides an image of an active reader, constantly working to achieve meaning with the guidance of the text" (p.14). "Children are born makers of meaning," affirmed Peterson and Eeds (1990), when explaining their approach to teaching literature to children as "a more complex activity than simply [teaching] to decode letters into sound and finding correct responses to prepared questions" (p.6). They also explained why they choose the concept of *interpretation* over *comprehension* of texts reinforcing the idea that interpretation means personal construction of meaning.

For Rosenblatt (1976), the sharing of experiences about reading becomes the basis of valuable interchange among peers, that strengthens the idea of appreciation of multiplicity of interpretations: "Discovering that others have had different responses, have noticed what was overlooked, have made alternative interpretations, leads to self-awareness and self-criticism" (Rosenblatt, quoted in Bainbridge & Pantaleo, 1999). By teaching how to cope with different ideas, "teachers help children stretch the boundaries of their own knowing. Children

learn to enjoy the activity of meaning making and become able participants in the give and take of its construction" (Peterson & Eeds, 1990, p.16).

Reading clubs in action

How do they work?

Reading clubs, in the form of small groups, meet regularly in the classroom under the supervision of the teacher. Two main components characterize the activities of these clubs: the reading and the responding to the reading.

Individual, "self-paced", "sustained silent reading" of the books children select themselves appears to be the most popular reading activity (Spiegel, 1998, p.43).

In responding to the texts, the writing about what has been read either as entries in a journal, post-it notes or even notes in the margins are strongly emphasized by many reader response approaches (Spiegel, 1998; Sumara, Davis & Van Der Wey, 1998; Raphael & Boyd, 1997). Based on prior literary research, Sumara et al. (1998) stated that, "the act of reading requires an act of writing by the reader" (p.138). The dynamic process of interpretation the reader is engaged in when reading is aided by writing practices; by highlighting passages in a text or writing notes in the margins the reader constructs his own meaning while reading.

This practice helps the reader to "collect a trace of [his] ongoing interpretations" (Sumara et al., p.138), making possible to go back, revise and reflect.

In addition to the written responses, it is important to share and exchange oral responses with peers, for it "permits intensive, extended interactions over books (...) allows sustained dialogue and a forum in which to raise questions, argue, reflect, and negotiate meaning" (Spiegel, 1998, p.43).

Dialogue is considered to be the best resource for teaching literature and to use in text interpretation (Peterson & Eeds, 1990) and many authors agreed that group discussion is a valuable tool for the collaborative construction of meaning (Möller, 2002; Jewell & Pratt, 1999; Dugan, 1997, Peterson & Eeds, 1990).

During discussions, children listen to each other, agree or contradict points of view, justify their ideas—sometimes with the aid of visual materials such as drawings, pictures and maps—and reflect about other's contributions, structuring their responses based on that. Within a context of collaboration and "playful interaction," children learn from each other and gain deeper insights about the stories they read (Daniels, 2002).

The role sheets model

One of the most popular approaches to set up reading club's discussions is the one created by Daniels (1994). He introduced the strategy of *role sheets* to help children learn the dynamics of discussion within reading groups. According to Daniels (1994) the role sheets are the most important tools other than the books themselves because they equip the members of the group with a "different thinking task," tasks that are "designed to enact the key principles of collaborative learning and to initiate a genuine, kid-led, self-sustaining discussion" (p.75). Among these roles, he offered a discussion director, a connector, an illustrator and a summarizer.

In practice, the role sheets showed that in many cases they could be too restrictive for children, to the point of impeding dialogue instead of facilitating it. Daniels (2002) acknowledged that the role sheets could lead to mechanical or artificial discussions, jeopardizing interaction instead of facilitating it, and advises teachers to use them as a starting point. The following are two excerpts from an e-mail list about literature circles, where elementary school teachers share their experiences in relation to the practice of implementing the role sheets approach:

> "I am not a proponent of all the roles Harvey Daniels suggests because I have found that kids get bogged down in them, but the connections and discussions are the most valuable part of my reading practice" (sharelit@yahoogroups.com).

> "(...) Beginning with the roles was not a bad idea as it does give a format to the circles. I guess I just feel that the real meat happens when the kids bring their opinions and feelings to the discussion and the roles seem artificial" (sharelit@yahoogroups.com).

The use of signals

Jewell and Pratt (1999) implemented in their second- and third-grade classroom a system of protocols for successful discussions, consisting of turn-taking procedures, signaling before speaking and exploring the proposed topics in depth before moving on to another. Children are asked to signal before they speak, informing if they are proposing a new topic for discussion, if they are linking to other's comments, if they want to pose a question, or disagree with a peer's comment. The teacher's role is a primary component of their approach; they limit their participation to the modeling of these protocols for good discussions,

in order to ensure children's ownership of the dialogues. The practice of these student-led discussions have proved to be beneficial in facilitating connections of ideas between peers and eliciting opinion statements, agreements and disagreements and the use of supporting evidence (Jewell & Pratt, 1999).

Evaluating the reading club model

From the postings in an e-mail list about literature circles in the elementary classroom (sharelit@yahoogroups.com), issues were identified that showed some limitations of the reading club model with respect to time constraints and equity in time for collaboration, effective ways of monitoring discussions and performance assessment.

Equal time to share

Teachers expressed the need to engage students in a balanced discussion where all children have equal time to share, rather than the discussion being monopolized by stronger children. "In some classes I have used poker chips: you put a chip in when you want to speak," explained one teacher when discussing the turn-taking routines (sharelit@yahoogroups.com). Another teacher said that in her class, children do not monopolize the discussions because when assessing the group work she asks a quieter child to share what the group discussed.

Performance assessment

Teachers try a variety of ways to assess the performance of a group, falling in general into practices that contradict the very essence of the reading clubs, for they transform the playful, natural interaction that happens during discussions into a rigid "quizzing" and recalling of actions at the end:

> "When they think they have had a meaningful discussion by sharing all the role response sheets they brought to class, the group comes over to me. I briefly look at each sheet (...) and I randomly select one response (...) and I ask someone who did not complete that particular sheet to share with me the conversation that took place about that piece of info—if they can't do it, I send the group back to have more discussion" (sharelit@yahoogroups.com).

Monitoring discussions

Regarding the impossibility of monitoring all the discussions in the class, a teacher said that it is particularly hard to get around and eavesdrop on all the discussions, adding that it is not enough to hear about what children discussed in their reflections later:

> "I used their role sheets to assess them, but it seemed wrong to assess them on that when the whole beauty of the literature circles is the discussion. I'm

looking forward to someone else's answer to this question" (sharelit@yahoogroups.com).

Motivation to read

Motivation to read is a major concern among teachers and parents, who see many children who do not read outside school activities and who consider reading a boring practice that relates to homework. Television, computers and videogames have an impact on this, for they provide fast entertainment engaging children in interactive and collaborative games that are more consistent with their interests, while distracting the young audience from books.

Children today use computers not only for entertainment purposes, but also as a communication and information tool. Sadler Takach and Varnhagen (2002) talked about children that are "frequent users of educational technology and are experts in relaying experiences of learning with and from new media" (p.133). Since computers are already integrated in children's lives, it is suggested that the use of a computer-based instruction in the form of a reading club online could succeed in attracting children to reading activities.

A conversation with educators regarding motivational aspects of computers in relation to reading activities generated positive comments. Thirteen graduate students in Education participated in this conversation, all of them with several years of teaching experience in Elementary Schools. They were presented with preliminary ideas for the design of an online reading club, and their comments suggested that the computer could be used successfully as a motivational tool. One student commented: "...a question I asked myself last week [was]: How to motivate children to love reading? Those kids are interested in the Internet, computers... they may find the joy for reading through that [a reading club online]. I can see this working with kids who don't like reading."

Computers in education

According to Poole (1997), the advent of the computer had an impact on communications and information, opening new opportunities for interaction. Distance learning was particularly affected by this phenomenon, as the *virtual* schools appeared, where students embark in online learning experiences that could be "cross-cultural, cross-racial, and cross-economic" (Poole, p.206). Poole explained the advantages of using computer-based instruction, suggesting that it is not only beneficial in supporting teaching and learning, but also in

supporting "children's socialization", for it fosters cooperative work. "The computer is a tool to share" (Poole, 1997, p.12) that not only facilitates the writing of a paper together, but also brings the possibility of online collaboration, connecting students, schools and communities worldwide.

Technology to facilitate everyday activities

In the Information and Communication Technology curriculum (Alberta Education, 1998) the importance of student training in the use of information and communication technologies is stressed, highlighting the introduction of technology in activities in everyday life.

The ICT outcomes (Information and Communication Technology, Alberta Learning, 2000-03) also frame the teaching of technology within the context of the needs of solving real-life problems. "Activities, projects and problems that replicate real-life situations are effective resources for learning technology" (p.1). And they emphasize the importance of training children to cope within a reality where "advanced technologies are more pervasive today than they have ever been, and their uses are expanding continually. ICT is significantly enhancing and altering human activity, and enabling us to live, work and think in ways that most of us never thought possible" (Alberta Learning, 2000-03, p.1).

Online collaborative learning environments

There is an increasing body of research being done in the fields of computer science, social sciences, information technology and instructional design, among others, regarding the design of effective, computer-supported, collaborative learning environments. According to Gross (2001), the research has shifted the focus, from whether online collaborative learning was more effective than online individual learning, to the need of establishing the components that make these virtual collaborative learning environments effective.

In spite of the increasing interest in these areas, there is still a need for a more synergistic and interdisciplinary view of these topics that would contemplate "learning theories, learning environment components and actors" (Lowyck & Pöysä, 2001, p.514).

Social interaction

For a virtual learning space to support a rich collaborative activity, it must meet, simultaneously, three conditions: the active construction of knowledge, peer teaching and learning, and motivation of feedback (Gross, 2001, p.448). Social interaction becomes the key factor in the efficacy of these learning environments (Kreijns, Kirschner & Jochems, 2003; Gross, 2001). For social interaction to occur, these spaces must motivate and invite the user to participate

and engage in dialogue with others. However, it has been found that the nature of text-based computer-mediated communication can hamper the exchange (Kreijns et al., 2003; Collins Tidwell, 2002; Mealing, 2000).

Text-based communication

Being purely text-based in nature, computer-mediated communication affects the way people communicate. The lack of non-verbal cues such as facial expressions, posture, voice volume and intonation, and a common social and physical context (disposition of tables and chairs, lightning, etc.) affects the exchange among users. The fact that they can not see, hear or feel the presence of others, and that they can only rely on words to transmit their own presence and emotions produces in people different levels of uncertainty and frustration (Kreijns et al., 2003; Collins Tidwell, 2002).

Synchronous or asynchronous communication, depending on whether the users are co-present or not when communication happens, is another factor to take into account. Asynchronous communication adds the time gap between interactions, removing the immediacy as a tool to reassure presence (Hansen, Dirckinck-Holmfeld, Lewis & Rugelj, 1999).

Social presence

The perception of our own presence, another's presence and a common social space are very important for the development of trust, respect and community in online environments (Kreijns et al., 2003). According to Heeter (1992), there are three dimensions of presence: personal, social and environmental. The personal dimension relates to the experience of self, which varies from persons and characters to non-human shapes; social presence refers to the perception of others, who also exist in that virtual world and react to us; and environmental presence relates to the idea that the space itself is aware of our presence and also reacts to us (Heeter, 1992) (Fig. 1).

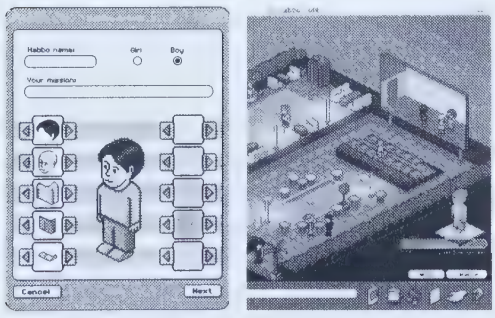


Fig. 1 Habbo Hotel is a virtual hotel where teenagers meet and chat with friends. (www.habbohotel.co/uk)

Visual tools to aid online communication

The limitations in text-based communication have raised concerns about how to compensate for these difficulties in order to facilitate social interaction in the online media. Hansen et al. (1999) differentiated between tools to "compensate for difficulties" in the communication, and tools to "facilitate new processes." The former refers to tools that serve to alleviate the difficulties users might face during virtual communication. An example of this could be the use of *emoticons* or icons designed to express emotions and moods in online chat systems (Fig. 2).

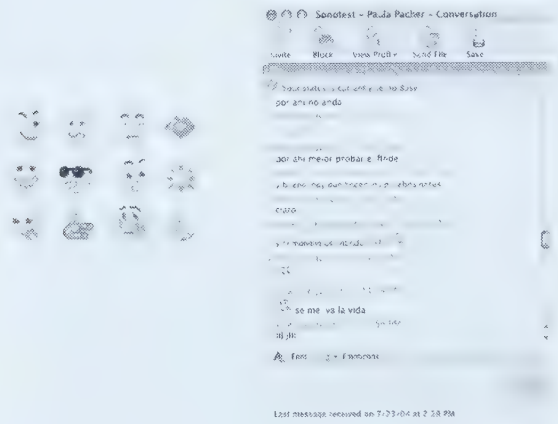


Fig. 2 *MSN Messenger* is an online, text-based instant messaging system, aided by graphics called *emoticons* that help to compensate for difficulties in the communication.

The latter refers to alternative tools that help the user to see information in new forms that are easier to understand, such as concept maps or visual networks (Fig. 3).

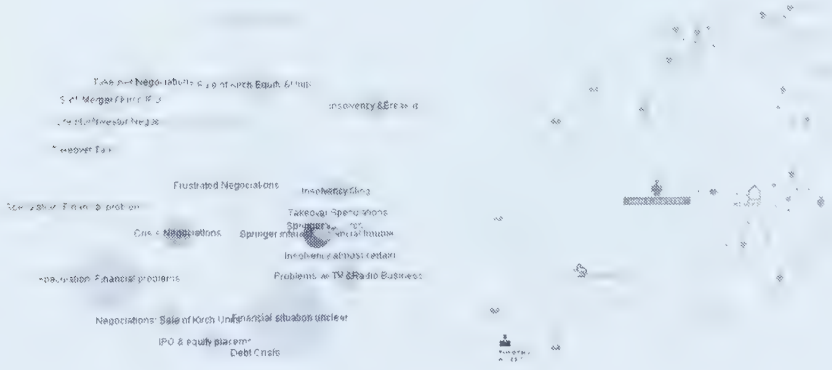


Fig. 3 www.thinkmap.com

The use of visual tools to show the participants and their interrelationships, the shared artifacts such as ideas or images, and the settings or environments where these interactions occur are among the issues found in relation to the perception of social presence (Biuk-Aghai, 2001; Chuah & Roth, 2003; Borges Gouveia & Borges Gouveia, 2002). Biuk-Aghai (2001) explored the way adult virtual teams collaborate aided by visualization tools that reveal the *structural* and *behavioural* aspects of such collaboration. One of his major claims is that visual tools help people to make sense of the virtual collaboration; understanding what people are doing and how they are interacting helps create awareness of presence. He also referred to visual tools as helpful in the collection of data, suggesting that this creates an advantage of virtual settings over face-to-face ones for it allows users to go back to the stored data in order to analyze it (Fig. 4).

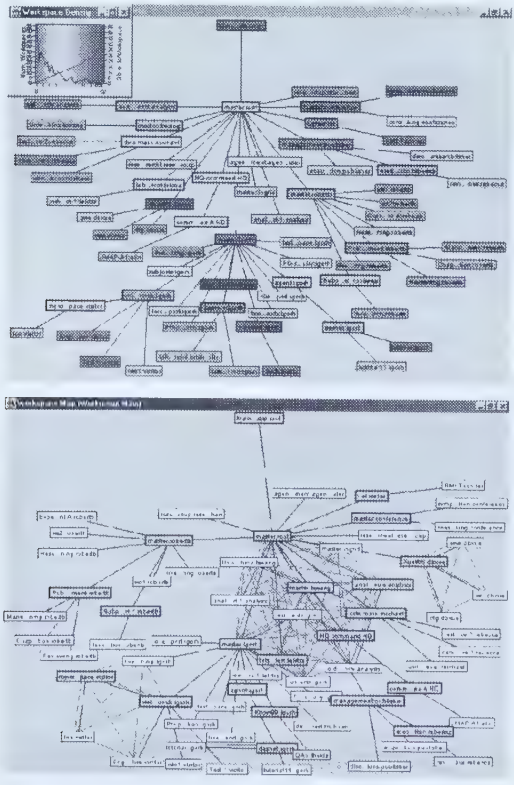


Fig. 4 *LiveNet*. A collaborative virtual environment system that supports asynchronous collaboration (in Biuk-Aghai, 2001).

Reading clubs online

Reading clubs online are a form of computer-supported collaborative learning environments where children are expected to interact with one and other through dialogues about texts in order to construct new meanings together. Opening the possibilities for interaction to children from different schools, backgrounds and cultures, the reading club online broadens the communication between peers in and out of the classroom.

The live and the virtual reading club

Within live reading clubs children share the same physical space; verbal communication is aided by non-verbal cues such as facial expression, gesture, voice volume, inflection and tone. If a child wants to say something he raises his hand to call the attention of his peers, or he simply raises his voice in order to be heard. Similarly, expressions of approval or disapproval are manifested with a change of facial expression or tone of voice. Features of the social and physical environment such as disposition of tables and chairs, body posture and movements, also help in making sense of the discussion and getting engaged. The fact that they are sitting on chairs, on the floor or around a table affects the kind of interaction children may have. In face-to-face environments, all these physical and visual elements facilitate the interactions.

When this interaction takes place online, and is therefore virtual, the need to define social presence and a common social space becomes crucial; and as discussed previously, the text-based nature of computer-mediated communication does not succeed in providing all the elements needed for a rich communication to happen.

Daniels (2002) invited teachers to try "book clubs on-line" (p.21), as a variation on the strategy of the face-to-face literature circles. By exchanging e-mails at a pre-determined set time, children *talk* about books. "Because everyone is online at the same time the messages pile up pretty fast and there's plenty to read, think about, and answer" (Daniels, 2002). It could be argued that the mere exchange of e-mails could support dialogue. The "pile" of messages that Daniels referred to does not necessarily sound or look inviting to engage in any dialogue; and it does not suggest either that children can perceive the presence of others actively talking in a common space (Fig. 5).

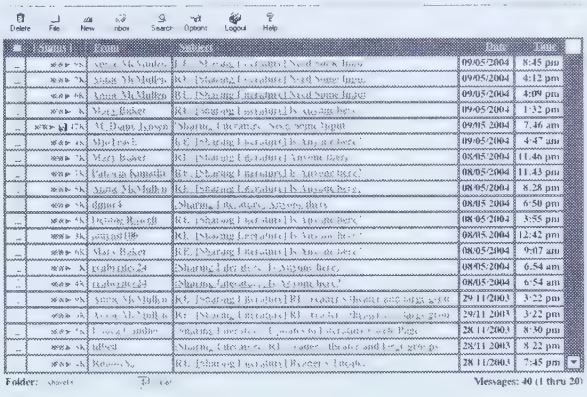


Fig. 5 The *pile* of messages in this e-mail inbox does not necessarily invite students to engage in dialogue. (www.webmail.ualberta.ca)

The existing online reading clubs are set in a linear text-based format, and although social presence is not seen, nor necessarily perceived in these spaces, children are still expected to participate in discussion activities that demand high levels of motivation and engagement. These online clubs present the same problem found in the e-mail exchange: children's contributions are shown as a succession of lines of data, one posting below the other, with no apparent internal relationship more than chronological order (Fig. 6, 7).

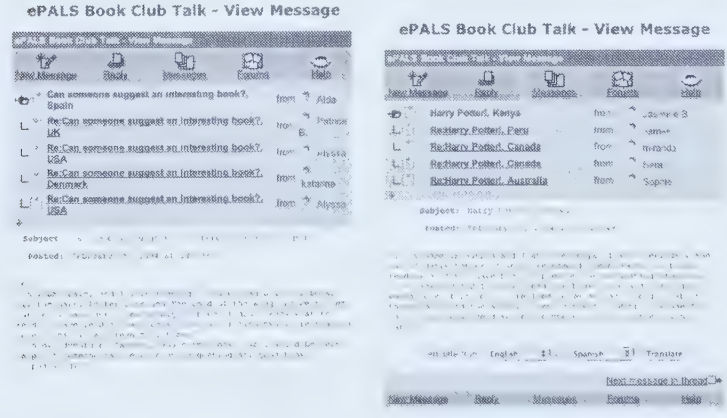


Fig. 6. It becomes difficult to follow the dialogue in this book club. *Who is talking to whom?* (www.epals.com)

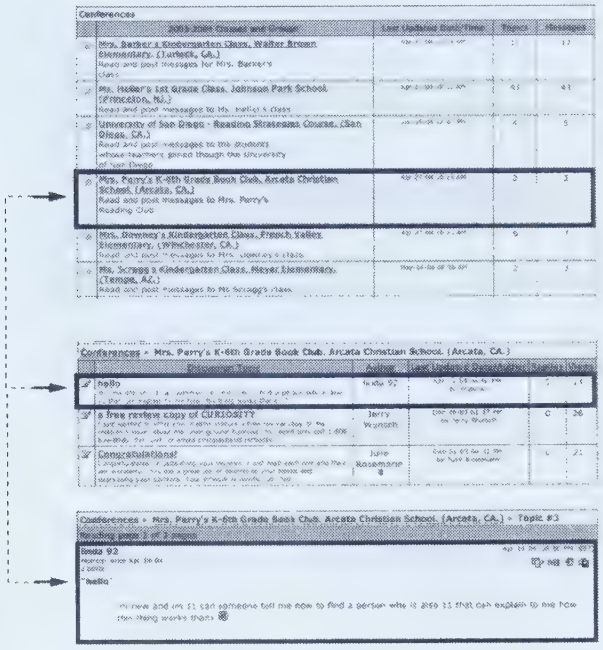


Fig. 7 Sequence of messages nested in folders.
An eleven-year-old child wants to participate but he is having problems in understanding the functioning of the discussion forum. *"I am new and I'm 11 can someone tell me how to find a person who is also 11 that can explain to me how this thing work?"* (www.spaghettibookclub.org)

In an exploratory research project in which the way adults communicated within web-logs was observed, Brisbourne, Pacher, Radzikowska and Robertson (2003) suggested that the lack of context and visual aids to show the flow of dialogues and interconnectedness among participants did not encourage them to engage in discussions, even though the topics they were individually contributing appeared to be connected when mapped (Fig. 8). These observations raised questions regarding the use of visual tools to aid the online communication:

- Is the linear and sequential aspect of the postings discouraging to engage in dialogues?
- Will a visual representation of the conversation that depicts the connections among participants encourage them to build dialogues?

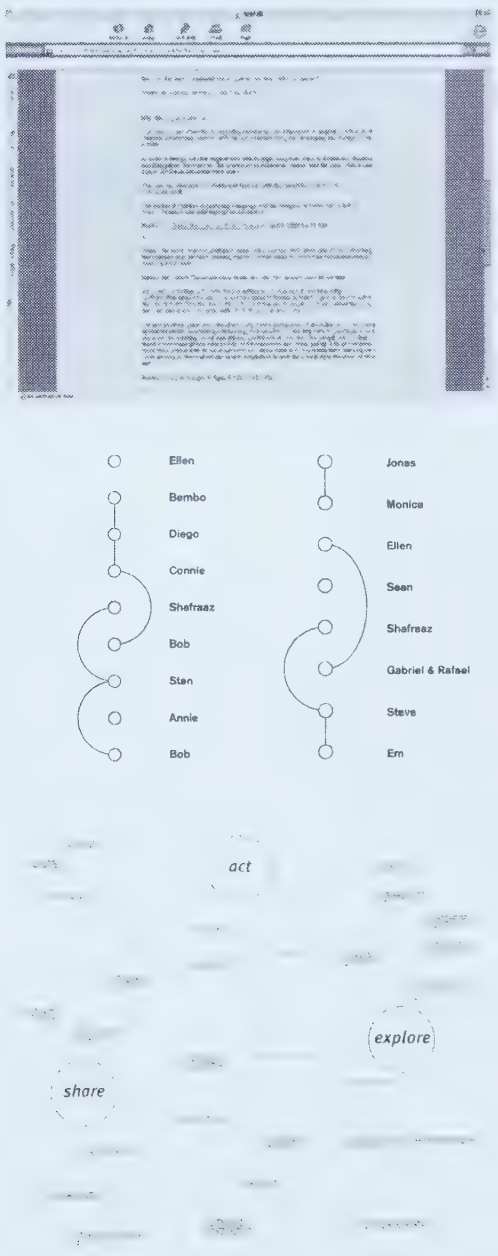


Fig. 8 *DesignSpace* helped to see that the text-based nature of the communication online did not support dialogue in this web-log. From top to bottom: a screen-shot of the website, first stage in the analysis of postings, and resultant map.

Visual tools

Linear vs. holistic understanding of information

People have used images to communicate ideas since prehistoric times. When verbal language was not yet a tool for communication, people naturally used painting to communicate thoughts, ideas and events. Later, with the rise of language and writing the capacity of images and diagrams to express what words cannot was overlooked, and picture making was progressively displaced becoming just a form of self-expression or entertainment (Hyerle, 1996; Frascara, 2001).

The use of verbal language, however, is limited in its capacity to convey information for it "promotes linear thinking and sequentiality, and is very poor in the presentation of hierarchies, inclusions, simultaneity, distinctions of levels, multiplicity of kinds and complexity of connections" (Frascara, 2001).

Bertin (1983) distinguished three levels of meaning in the display of visual information: elementary (simple connection between two elements), intermediate (recognition of sub-groups) and overall (connections between major groups), complexities that could not be shown in a linear text-based fashion. The linearity of text does not succeed in showing the interconnections among data nor the overall structure, focusing on the view of isolated parts that results in partial views of problems that may be much more complex in nature (Hyerle, 1996; Frascara, 2001). Within an education system that strongly favors verbal language, students are confronted with huge amounts of information that is presented as a succession of lines or "walls of text", that automatically sets them in a "linear mindset", making difficult the reasoning, analysis and reflection that is extremely important for a rich learning process to occur.

On the other hand, the use of visual tools allows for a more holistic view of information, as a dynamic system of interconnected elements that affect one another; "as one part changes, it has an effect on the other parts" (Hyerle, 1996, p.xi). By providing information displayed in a variety of ways such as diagrams, charts, concept maps and webs, educators allow students to find their own ways of acquiring knowledge.

Tools for sharing and reflection

Hyerle (1996) defined visual tools as instruments for "constructing representations of knowledge (...) remembering, communicating and negotiating meanings" (p.11) and he added that these visual tools are "dynamic and constructive in the hands of the students" (p.24). Learners use them not only for organizing information, but also for brainstorming activities, as organizers

of ideas to facilitate dialogue and perspective taking and as tools for meta-cognition and self-assessment, among other functions. These tools allow processes of "generating, analyzing, organizing, synthesizing, and evaluating meanings" (Clarke quoted in Hyerle, 1996, p.24), becoming effective for collaborative learning for they facilitate the sharing of ideas, the appreciation of different perspectives and the connections between ideas and peers. An important aspect of the use of visual tools in collaborative settings is that it "causes us to restrain our impulsivity, to suspend our judgments, to generate and consider alternatives, and to attend emphatically to other's perspectives" promoting in consequence "consciousness and flexibility of responses" (Hyerle, 1996, p.xiii).

Children and their use of images

Envisioning writing

Children enjoy working with visual tools and producing visual responses about reading and writing (Bromley, 1991). Many researchers have written about the importance of the use of pictures as a way of clarifying ideas before writing activities. Hubbard (1989) stated that visual thinking is an excellent complement of verbal language and that both systems should work together in the process of learning reading and writing. "If you do the picture first, then you have something in your mind that you could write. If you do the words first, then I don't know what to draw," commented Eugene, 6 years old (quoted in Hubbard, 1989, p.3).

Olson (1992) also disagreed with the purely verbal instruction where "words are used to elicit more words" (p.1). The act of drawing helps children to clarify and generate ideas, especially for those who have difficulties in writing (Hubbard, 1989; Olson, 1992; Hyerle, 1996; Arizpe & Styles, 2003). Olson (1992) demonstrated this in a study she conducted with children that, according to their teacher, were experiencing learning difficulties and behaviour problems. Using a *visual-narrative approach*, she asked children to perform a writing activity, which was followed by the drawing of the correspondent picture and the re-iteration of the writing. In all cases, the quality of the writings improved considerably thanks to the possibility of visualizing ideas more clearly and in greater detail. "I feel good. It's the longest story I've ever written. The pictures helped me a lot. They helped me to remember the story. Planning a picture story was easier because drawing is easier for me. It takes a long time to

learn how to write, but I've been drawing as long as I can remember," commented a third-grader (quoted in Olson, 1992, p.71).

Visual information

Visual literacy is an important skill that needs to be developed in children in order to be able to perform everyday tasks. This skill, not only enables children to understand the variety of visual information they encounter, but also provides them with different alternatives to organize and present their ideas (Moline, 1995). Moline stressed the advantage of providing children with other tools than "simple text", for it gives "support and confidence to those students whose strengths lie in visual perception or who communicate well by drawing" (p.3). By being trained in the use of visual tools such diagrams, charts, maps webs and tables, children open their repertoire of possibilities of displaying information, learning how to decide what type of representation is more appropriate for a specific purpose.

Webbing is a practice that uses diagrams to map interconnected ideas and concepts. Widely used in schools as a starting technique to facilitate student's generation of ideas for writing, webbing helps to connect information in flexible ways (Bromley, 1991; Moline, 1995; Hyerle, 1996). According to Bromley (1991), webbing enhances learning and promotes enjoyment of literature, and by promoting interaction and collaboration among peers, "the creation of webs allows the growth of collective wisdom" (p.6).

Aesthetic and style preferences of children

Parson's *Theory of Aesthetic Development* is the most significant developmental theory that deals with the evolution of perception and understanding of art in children (Arizpe & Styles, 2003). Parson stated that during the early stages of development, children respond naturally to aesthetic qualities of art, while the evolution to later stages is only achieved through nurturing (Danko-McGhee, 2000; Arizpe & Styles, 2003). Danko-McGhee emphasized the study of perceptual development in order to comprehend children's aesthetic preferences.

The five stages that Parson established were:

1. favouritism (ages 4-6);
2. beauty and realism (ages 6-12);
3. expressiveness (ages 10-15); and
4 and 5. style, form and autonomy (ages 15-21).

Beauty and realism

According to Parson's stages, ten and eleven-year olds do not enjoy abstraction, showing preferences for high realism, harmony and clarity; they also react to detail, designs and shapes.

From a study conducted with children interacting with picture books, Arizpe and Styles (2003) indicated that children belonging to this developmental stage tended to enjoy photographic realism and high level of details in pictures; at the same time, non-realistic aspects such as mixture of realism and surrealism were also among children's favourites. "While they loved the pictures of the animals, they were often as fascinated, by the strangely metamorphosing humans growing webbed feet, stripey bodies and tails" (p.49). Their findings suggested that children at this age "favour styles of art that amuse, delight and challenge them, and that the range of styles which they take pleasure in and understand is much wider than Parsons suggests" (p.50).

Ladan and Frascara (1979) conducted a study in which children's preferences for illustration styles were observed. Their findings showed that within a group of 400 children across elementary school, 95% of them preferred complex illustrations over simple ones. Other preferences included intense colours, natural forms over geometrical simplifications, and soft edges and atmospheric effects. [5]

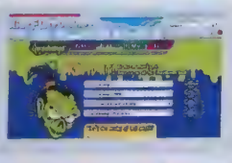
5 Note: in *foldout* the principles stated in this section concerning children's aesthetic preferences are applied by the author to children's websites.

existing websites

children's visual preferences

[based on Ladan & Frascara, 1979; Danko-McGhee, 2000; and Arizpe & Styles, 2003]

other styles

	beauty + harmony	realism	surrealism *amusement factors*	details + complexity	intense colors	natural forms	abstraction + geometric shapes	child-like style	cartoon-like style
barbie.com									
divastarz.com									
pbskids.org/arthur									
beverlycleary.com									
elgarabato.com.ar									
guysread.com									
habbohotel.co/uk									
kidscom.com									
myscene.com									
playhouse.com									
 place.scholastic.com									
teletoon.com									
whatsherface.com									
ytv.com									

	beauty	realism	surrealism *amusement factors*	details + complexity	intense colors	natural forms	abstraction + geometric shapes	child-like style	cartoon-like style

Design response

PROPOSAL

The purpose of this project was to design a visual tool intended to facilitate interaction, collaboration and dialogue in children's online reading clubs with the ultimate goal of attracting and engaging children in reading while fostering literary competence.

Summary of concepts

Reading clubs constitute a collaborative learning approach to teaching literature with a strong student-centered component; social constructivism and reader response theories constitute the core of these clubs. Children play an active role in the construction of their own meanings from texts, while exploring, by interact-ing with others, the multiple interpretations a text can elicit in different readers. Through a shared process of meaning construction, and using dialogue as the main tool, children learn the importance of respecting other's points of view, growing in their understanding of literature and enhancing their critical thinking skills.

However successful, the face-to-face reading club model presents some limitations regarding time constraints and equity in time for collaboration, efficient ways of monitoring discussions and assessing performance.

Due to the lack of reading habits in many children, how to motivate them to read becomes a major concern of teachers and parents—an endeavour that could be a challenge in a reality in which television, computers and interactive games engage children in interactive experiences.

Considering the way computers are already integrated in children's lives as a source of amusement, entertainment and information, it is suggested that the use of computers could succeed in attracting children to reading activities in a more playful, active and collaborative way.

Social interaction is the key for the effectiveness of collaborative online learning spaces, a factor that may be hampered by the limitations in computer-mediated communication due to its text-based nature. When considering the development of a reading club online, some difficulties arise related to the lack of social presence and the linearity of information displayed in these online media. The richness and complexity of discussion processes within reading clubs regarding interrelationships among participants, the nature of responses, and the flow of dialogue and collaboration cannot be shown in a linear text-based

structure, nor the sense of individual and group presence needed for social interaction to occur.

It is suggested that the use of visual tools could counterbalance the linearity of verbal language, allowing the visualization of structures and interconnections that otherwise could remain hidden. These visual tools could succeed in depicting the dynamic, organic and complex nature of children's discussions, in a way that creates a common social space able to facilitate interaction, collaboration and dialogue.

The research question stated for this project was:

How can a visual tool for children's online reading clubs facilitate interaction, collaboration and dialogue?

The proposition of using visualization tools was based on three premises:

1. *The use of diagrams allows the depiction of complex information and structures that cannot be represented in purely verbal-linear forms* (Frascara, 2001).
   By depicting a group of participants working in collaboration, a visual tool could help children in achieving a sense of social presence, facilitating the interaction and the building of a community.

2. *The use of diagrams promotes reflection* (Hyerle, 1996; Frascara, 2001).
   By visualizing the products of collaboration, nature of responses and conflicting points, the visual tool could help children in identifying opportunities for action. The use of tools could also restrain children's impulsivity, promoting the articulation of more elaborated responses.

3. *The use of diagrams reveals relationships that may be hidden if not graphically exposed* (Hyerle, 1996).
   By showing the network created by their contributions, the connections between participants and messages and the threads of discussions, the visual tool could motivate the active engagement in dialogue, facilitating the development of communicational skills, as well as promoting the appreciation of other's contributions.

Specific objectives, strategies and outcomes

The specific objectives concerning the design of the visual tool derived from the research question and relate directly to the three premises stated above. Objectives, strategies and outcomes are stated as follows:

1. INTERACTION

To provide an environment where social interaction is facilitated

The visual tool will help to visualize social presence and the live network of interconnected participants to:

- elicit awareness of social presence and provoke a response to it;
- foster the building of a literacy community and the sense of belonging to it; and
- motivate and inspire the active involvement and participation.

2. COLLABORATION

To engage children in the collaborative construction of meaning

The visual tool will help to visualize products of collaboration, responses, ideas and drawings to:

- encourage collaboration, peer support and scaffolding of ideas;
- encourage consciousness about the nature of responses; and
- encourage the articulation of complex responses.

3. DIALOGUE

To enable conversation, reflection and analysis

The visual tool will help to visualize paths of interaction, connections and threads of dialogue to:

- foster the development of communicational skills;
- encourage the 'active' listening to other's ideas;
- foster the appreciation of multiple interpretations of a text; and
- promote reflection about their own and other's contributions.

DESIGNING THE PROTOTYPE

The process involved in the design of the prototype started simultaneously with the reviewing of the literature. Several sketches were developed in this stage, in a way of visualizing what was being learned, which in turn contributed to the evolution of the visual conception of the prototype. Beginning with sketches that attempted to depict the structure of a reading club at work, and by an iterative design process that incorporated each time new elements, what was originally a depiction of abstract concepts to aid the thinking process became the set of visual tools used during the testing.

How do reading clubs work?

The design process began with a stage that involved the sketching of abstract concepts as a means to understand how reading clubs work, not only in terms of their functionality, but also in visual terms. To start with the mapping of the face-to-face model of reading club was considered essential, in order to be able to recover the elements that would be needed later in the online version, where the visualization of social presence becomes so important.

Some of the questions that guided this process were:

- How do we see a group of children working collaboratively to build meanings from texts?
- How do they talk in these groups?
- Do they take turns?
- Do they perform roles?
- Are there internal dialogues within the group discussion?
- When mapped, is this discussion circular, cyclical or organic?
- Do we need differentiation of topics, type of messages, connections?

A circular shape resembling children sitting around a round table appeared to be the most obvious way of depicting a reading club, or what Daniels (1994, 2002) called, a literature *circle*. The first attempts to recreate a reading club visually used Daniels' *role sheets* model, which, as explained in the background research, proposes the division of roles among students. This approach was considered useful in terms of providing the child with definite tasks to accomplish, helping her to begin understanding the dynamics involved within group discussions.

The first sketch depicted four students *(S)* within a circular shape; each of them

plays one of the roles (writer, connector, illustrator and investigator) to contribute to the creation of shared meaning *(M)* (Fig. 9).

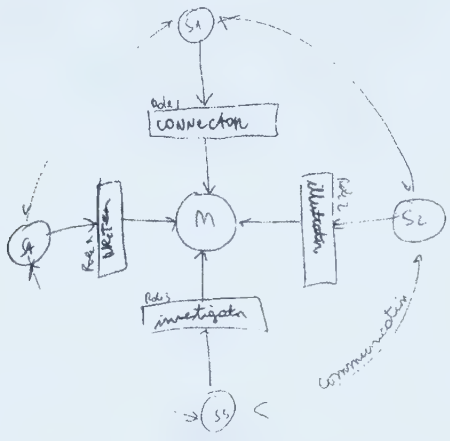


Fig. 9 A reading club according to Harvey Daniel's *role sheets* model.

After analyzing teachers and children's comments about the use of the roles, other ways of providing structure to the discussion that were less restrictive were sought. Figure 9 shows the first step in the adaptation of Daniels' model. It was slightly more flexible; each student *(S)* could choose alternatively the role he wants to perform in order to produce an individual response *(r)* to a supposed question *(Q)*. A second phase for discussion was added in order to stress the importance of the discussion in the creation of shared meaning (Fig. 10).

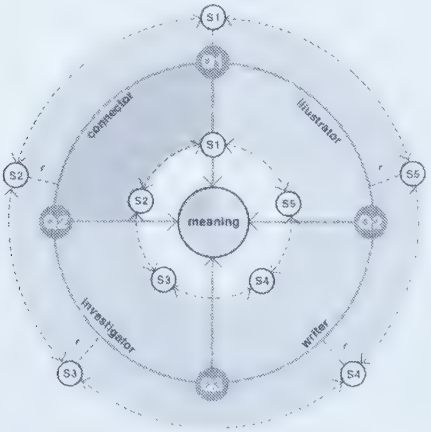


Fig. 10 Adaptation of Daniel's model: the roles can be chosen alternatively, addition of questions and a second discussion phase.

The third version shows the complete elimination of the roles, and this time it maps the functioning of four groups or reading clubs working together. Each group of five students *(S)* has to answer a question *(Q)* in order to produce a concept *(C)* that would contribute to the group construction of meaning. It is divided in two phases, being the first one the stage of individual responses *(r)* and the second one the sharing and discussion of concepts to arrive to consensus (Fig. 11)

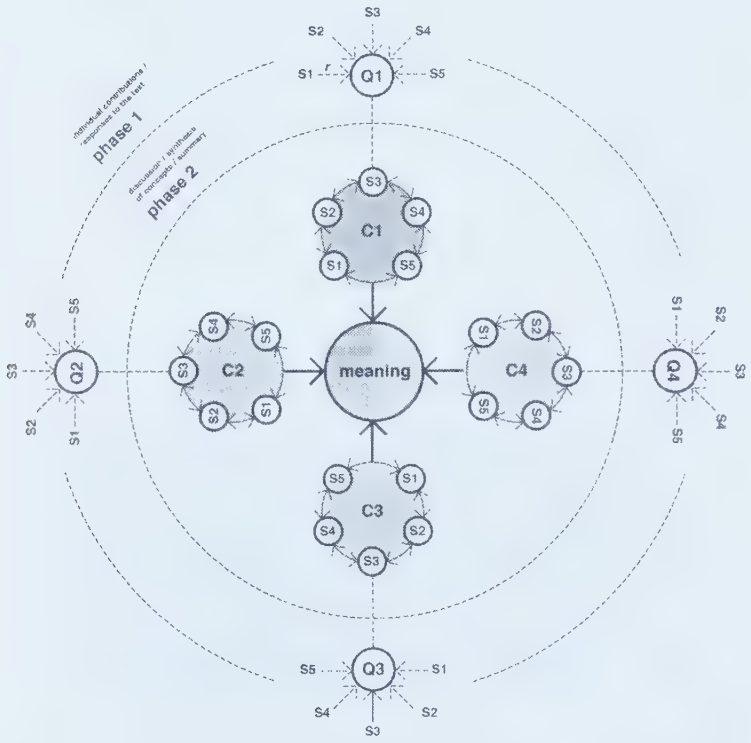


Fig. 11 Four groups or reading clubs working together in the creation of collective meaning.

In an attempt to achieve a more organic structure that allowed growing, the circle was replaced by flow charts. The result was a series of very rigid and linear diagrams, with clear and definite starting and ending points, a solution that did not achieve the flexible nature of the group discussions needed in reading clubs (Figs. 12, 13).

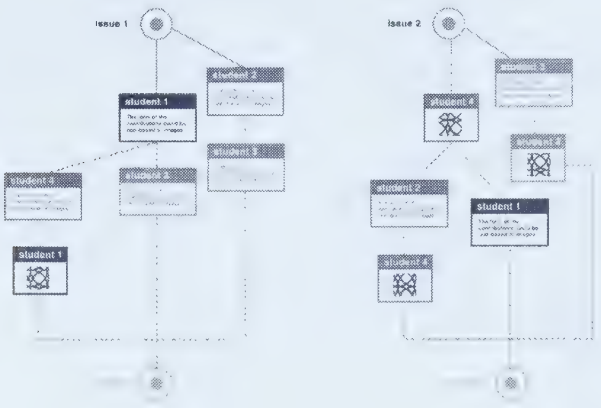


Fig. 12 Searching for a more organic and flexible form: flow charts.

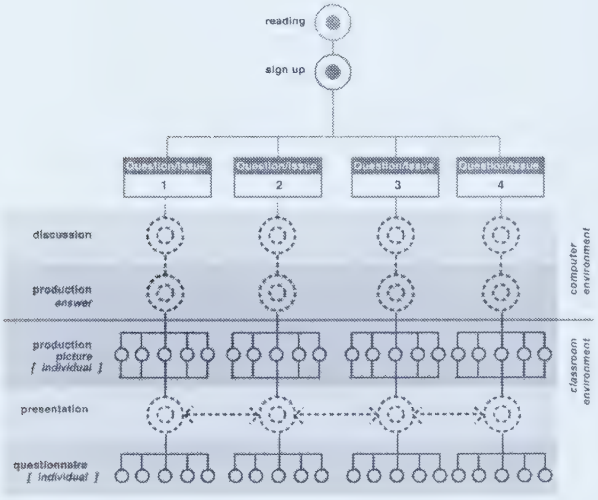


Fig. 13 Flow chart that introduces the division of phases between activities: to be performed through the computer and in the classroom.

During this stage of adaptation of the role sheets model, the elimination of the roles appeared to be an advantage, for it opened the possibility for a more natural discussion. However, as stated before, the roles gave structure to the discussion, and by eliminating them, this structure was lost. Specific tasks were introduced in an attempt to control the discussions, such as questions or issues to discuss, summary stages, group drawing and group presentation. With the addition of all

these elements, the instruction and the consequent visualization of it became more and more complex. Contrary to what was expected, the natural flow of the discussion seemed even more constrained in these new approaches than with the use of roles.

At this point, the sketching of abstract concepts began giving shape to what could be a starting point for the design of a visual tool to show discussions. The obvious became important at this point: a simple and clear instruction can be depicted with a simple and clear graphic; and for the creation of a tool that is intended to facilitate interactions, simplicity was considered essential.

Discussion space

The second stage in the design process began by considering something that was recurrent in all those previous sketches: the discussion phase. Children need a discussion space where they can talk freely about their insights, ideas and feelings about the reading. The particularities of this discussion space in the online reading club were considered next. Partners in dialogue would not share the same physical space; non-verbal cues would be removed; the natural spoken language would be replaced by messages posted on a computer screen; and the flow of the dialogue would depend on how much sense they made out of those messages. The need to show the live presence of children on the other side of the line was a major concern during this stage.

Among the questions that guided this process are:

- What is needed in this online space to facilitate interaction, collaboration and dialogue?
- How can we provide a space for free and open discussion?
- How can we encourage *talking* about literature when the spoken language is replaced by linear text?
- How can children be heard in a silent discussion?
- How can they show others that they are happy or upset?
- How can we provide them with a *visual voice*?

Following the sketching process, the flow chart was transformed into a less rigid form, a network or web that allowed expansion and had a more organic feel to it. Children's faces were added, and colourful shapes replaced the boxes (Fig. 14, 15). It became critical not only to show who is talking to whom in the discussion space, but also what kinds of messages are being exchanged.

An essential addition to counterbalance the lack of visual information was the icons to *code* the messages. A piece of writing, a thought, a drawing and a new topic became the first ideas for the *discussion tools* (Fig. 15).

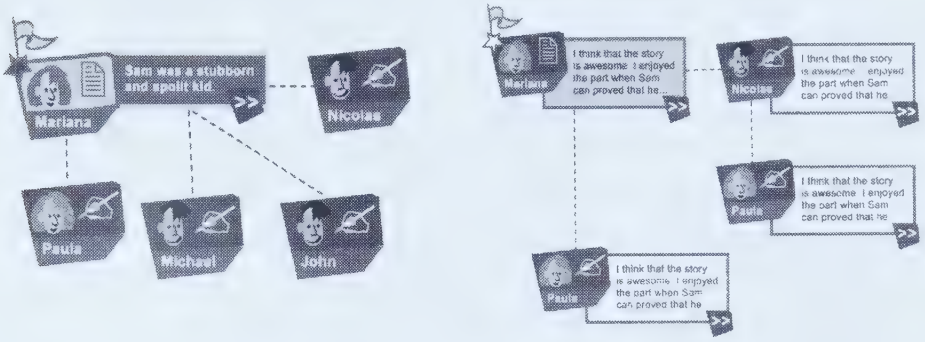


Fig. 14 The flow charts were transformed in more attractive networks.

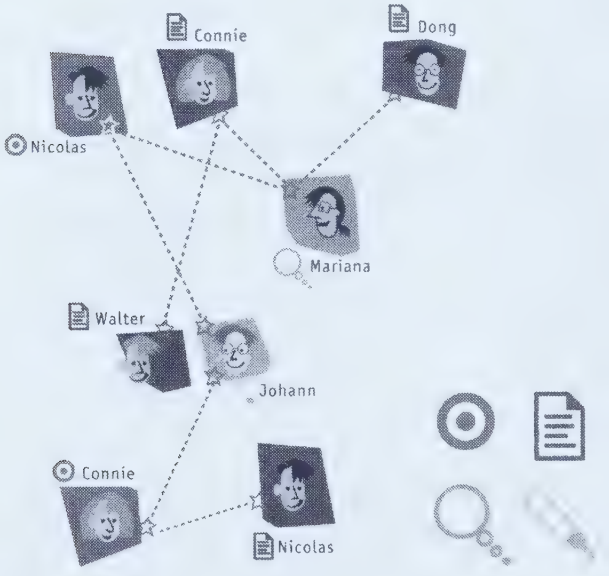


Fig. 15 First ideas for discussion tools: a piece of writing, a drawing, a new topic and a thought, which would aid children providing a "visual voice."

Having achieved a more flexible structure, and having in mind how important these discussion tools would be in communicating various levels of information in the online discussion, this idea was taken further. The next stage focused on the discussion online, the tools needed and the dynamics involved in the use of them.

Discussion tools

For the design of the discussion tools, and as a starting point, Daniels' roles were reconsidered as a means of recovering the principles he proposed to structure the discussions. With the aim of developing tools that could be alternatively used by any of the participants, some of the roles were transformed into broader concepts. In Daniels' model, a *discussion director*, for instance, develops a list of questions for discussion. For this project, this role was transformed into a *new issue* and a *question* tool, which enable any of the participants to start new topics or to ask questions. Not all the roles were considered and some other tools were added such as *agree*, *disagree* and *say something*, considered essential for the shaping of rich discussions.

A set of discussion tools was completed then, based on the idea of resembling the visual cues that help children engage in dialogues in the face-to-face environment. When they want to talk they raise their hands or they signal; they express agreement or disagreement helped by voice inflection and facial expression; and they make pictures to show elaborated and complex ideas to their peers. This *toolkit* would give children the visual tools needed to engage in a silent discussion with peers, would help them to structure their messages, and to see what others are saying (Fig. 16).

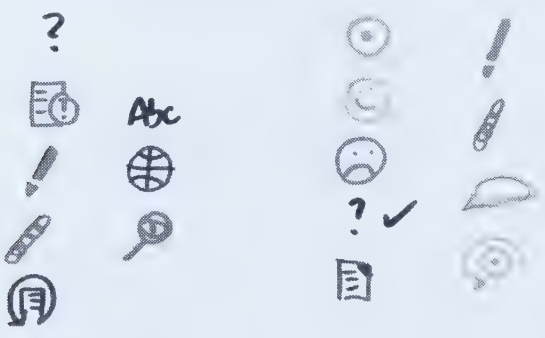


Fig. 16 Sketching a set of tools based on Harvey Daniels' roles.

Having determined a set of tools, the dynamics of how participants would talk within the online discussion was explored. Different ways of connecting to others were added to this set: a direct answer, an indirect answer or linking ideas (Fig. 17). Children's names and cartoon-like faces of themselves were added to identify participants during discussions. The messages were colour-coded according to the *discussion tool* used. To read the message, one would have to click on them so they would open, showing the text or image (Fig. 18).

Fig. 17 Set of discussion tools.

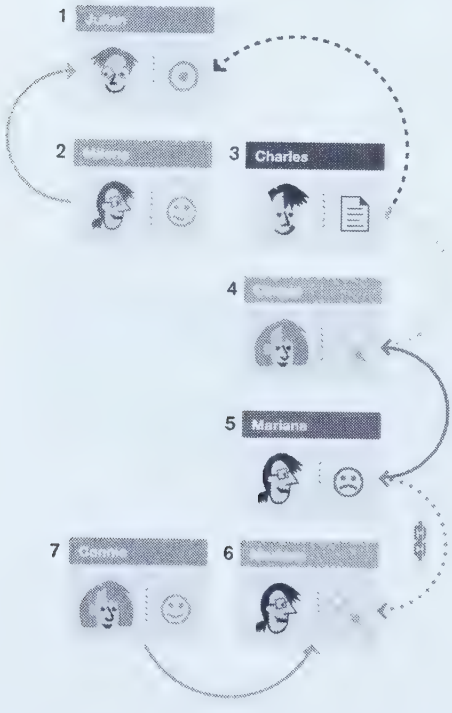
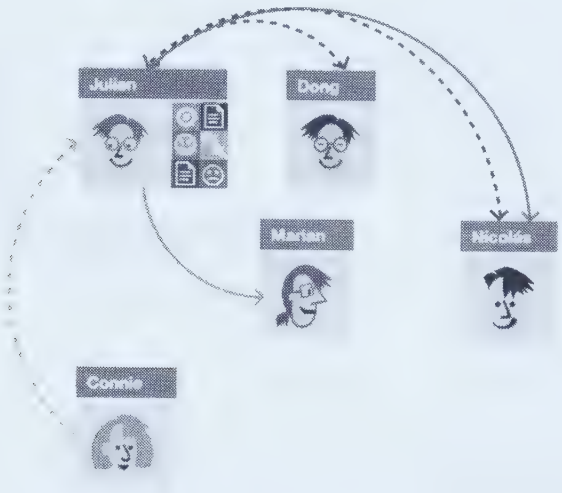


Fig. 18 Discussion dynamics using tools and links.

The idea in principle appeared to work, although the multiplicity of connections among participants began to look too complex. Among the alternatives explored in an attempt towards simplification, the possibility of using the mouse to hide or reveal connections was considered (Fig. 19).



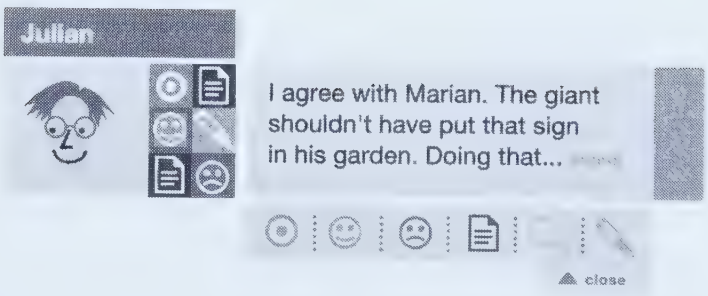


Fig. 19 (top) Possibilities to show or hide connections with the use of the mouse.
Fig. 20 (bottom) *Message box* in which postings are stored; it also provides tools for writing new messages.

This design stage ended with a preliminary idea for an interface, where children have a space to write messages, a toolkit with six discussion tools and a discussion space to see how the dialogues are getting shaped (Fig. 21). This stage was useful to understand issues such as the dynamics involved in a silent discussion online, the tools needed to aid this communication and some preliminary features to show presence.

Fig. 21 Preliminary interface design.

Paper prototype

A paper prototype was designed for the testing, instead of an actual website. Although time constraints did not make possible the development of a fully functional website, the real interest in this project was to find out how children communicate with the tools provided and not how children deal with technology.

The use of a paper prototype had many advantages. The most important was the removal of technology from the testing procedure. Children would not have to spend time learning how to deal with the computer in order to participate in the activity; a factor that was considered important for it permitted the inclusion of children who had no experience with computers and children with different cognitive abilities. In addition, the paper prototype would present only the information needed for the activity, eliminating possible distractions that the use of technology could cause, making easier to focus just on the relevant aspects of the study.

Since the scope of the study was to determine if the visual tools were useful in facilitating the interaction, collaboration and dialogue needed to engage in rich discussions about literature, the use of technology was not needed in this stage.

Other advantages of the use of paper prototype were:

- it enabled the rapid development of an artifact to test at a stage were not many things are definitive;
- it allowed re-designing and re-testing before designing the actual website;
- it permitted the identification of structural mistakes (Snyder, 2003).

The first step in the process of translating onto paper the ideas explored for the interface was thinking about how to design the activity so that it simulated the online experience of exchanging messages using the computer.

The elements pertaining to the interface were translated as follows:

- discussion space or screen: foam core board;
- writing space: notepad to write messages;
- tools/buttons: cards with the corresponding icons; and
- identification: cards with participants names and pictures.

All these elements (icons, identification cards, notepads) were put on a table and informally tried with adults. The objective of this was to find out if the suggested tools were useful, if more tools were needed, and whether the dynamics of discussion through writing and posting messages on a board were effective (Fig. 22).

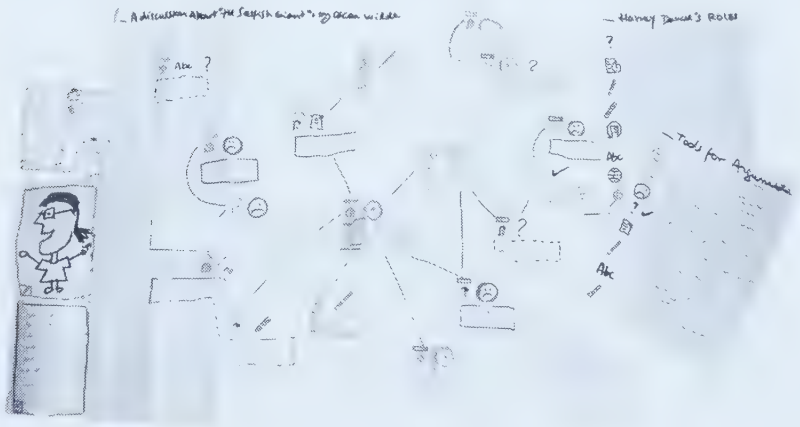


Fig. 22 Trying the silent discussion game, helped to see the functioning of the tools, dynamics and overall approach.

This first silent discussion activity suggested that the discussion tools, connections and overall network were useful. The discussion tools helped to structure the messages, they created opportunities for action if someone did not know what to write about, and they signaled on the board what kind of message the participants were posting. The lines were useful in connecting people and building threads of dialogue, and the overall network showed growth, and the presence of people collaborating.

Regarding practical aspects, a bigger space to write was needed, and the pictures or drawings need to be included in the body of the message; it resulted in difficulty identifying the author of the picture if it was presented as an attachment and removed from the message.

The next step was to think of a "container" for these elements. The first *discussion toolkit* created consisted of identification cards, a set of individual notepads with six different icons—coding the six different types of messages—and a black marker to draw lines to connect with others on the board (Fig. 23). The discussion space was planned as a board in the centre of the group (Fig. 24)

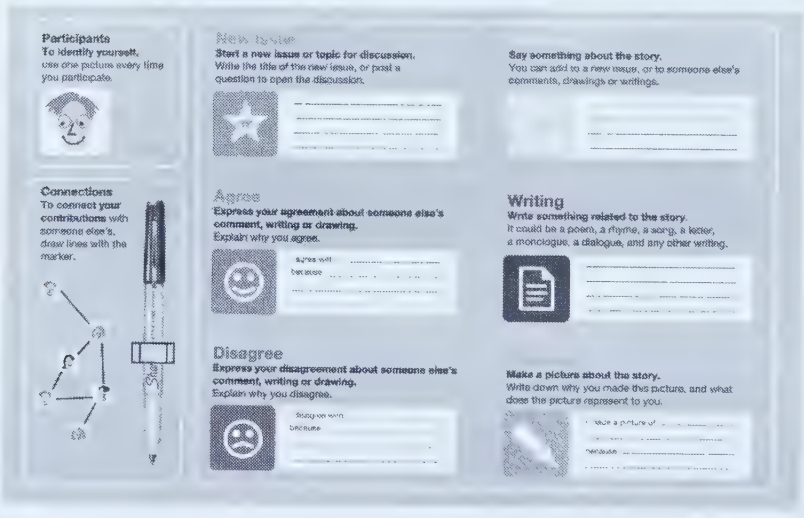


Fig. 23 First mock up of the discussion toolkit.

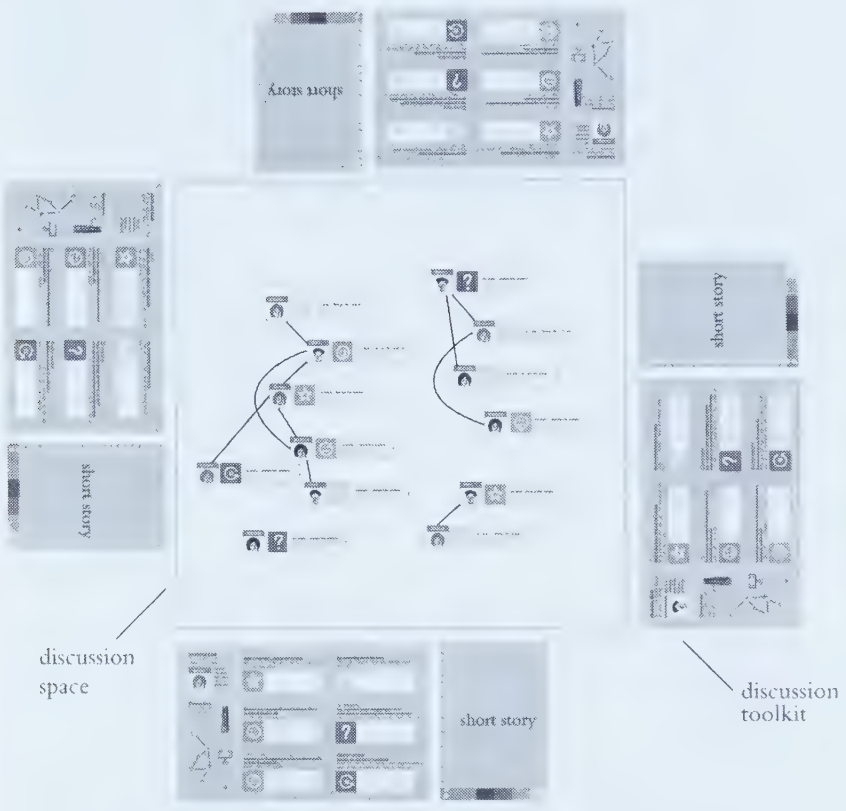


Fig. 24 Discussion space in the centre, discussion toolkits for four participants and booklets with the short story to read.

Discussion toolkit

A preliminary observation of children's websites (see appendix A), an exploratory study and previous professional practice informed the process of designing the prototype. Since the study of children's preferences regarding self-representation in online media was out of the scope of this project, this is an issue that requires further research. During the study, some questions concerning self-representation in the online medium were addressed in the questionnaire.

From conversations with the teacher in charge of the class it was clear that the children who were going to participate in the testing of the prototype were

competent in the use of computers. Considerations for the design of icons and buttons took this into account, but further study should be done for the implementation of the system with children of various computer skill levels, including novice users.

A preliminary discussion toolkit design consisted of the design of characters for self-identification, discussion tools and overall organization of the discussion toolkit.

How did the silent discussion work?

It was essential to analyze, in depth, the procedures involved in the silent discussion before designing the discussion toolkit elements. Each child would have a discussion toolkit, consisting of a notepad to write messages, a set of discussion tools to code the messages and identification cards to identify themselves within the discussions. The discussion would take place on a discussion board that the group would share. To facilitate the process, stickers were provided for the tools and identification pictures, and pushpins to place the messages on the board.

Every time a participant wants to *say* something, they would have to to:

1. choose the tool they want to use and place the correspondent sticker on the notepad;
2. write the message or make a drawing;
3. place a sticker with the identification picture on the notepad; and
4. place the message on the board and draw a line connecting their message with someone else's.

Characters

The design of the characters for self-identification was considered important to create a sense of presence. As shown in the background research, it is important that users see themselves and the others in the online media. A preliminary observation of existing children's websites showed a wide range of styles of representation of the human figure, from very child-like drawings to very detailed stylized figures of women and men that depict characters much older than the intended audience (Fig. 25). Super-heroes, monsters, aliens and other non-human shapes were also found in children's websites (see appendix A).

Fig. 25 Wide range of styles of representation of the human figure in existing children's websites. From left to right: elgarabato.com.ar; cartoonnetwork.com; beverlycleary.com; divastarz.com; barbie.com; whatsherface.com; myscene.com

Many websites were found that offer children the possibility of creating their own characters during the online visit; colour of hair, eyes and skin, clothing, shoes and even context are among the possibilities (Fig. 26, 27).

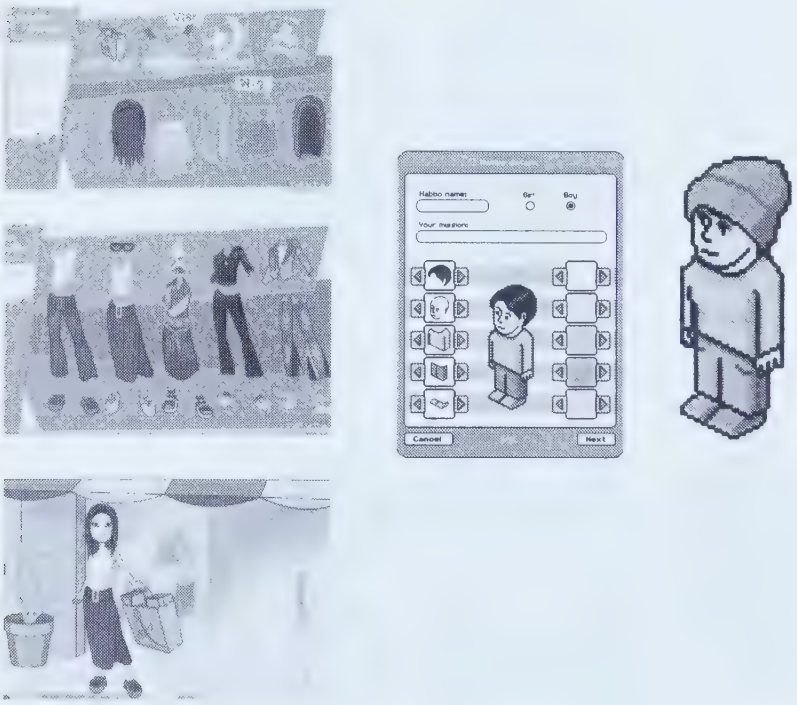


Fig. 26 (left) In whatsherface.com the user is invited to "mix and match fashion to create your own very look." Fig. 27 (right) Customization of characters to participate in a virtual hotel chat room (www.habbohotel.co/uk)

The customization of characters was considered an excellent idea for the final design of the interface, meanwhile, the need to create characters for the testing resulted in the creation of two generic characters.

A preliminary review of children's websites had shown a recurrent use of flat planes of intense colours, cartoon-like styles with realistic details, and the use of humour in the creation of characters (see *foldout*, p.35). Based on these observations, two characters, girl and boy, were designed. Simple lines and flat planes of colour were used for their faces and hair, considering that these features had to be recognizable when reduced to smaller sizes. The face, which was the element that would identify children within discussions, was exaggerated in size in relation to the body. Height and body were consistent across characters, as these were not distinguishing features (Fig. 28).

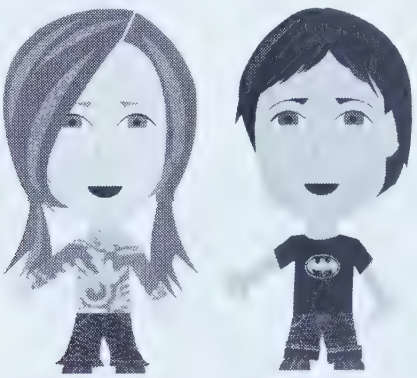


Fig. 28 The two generic characters designed, girl and boy.

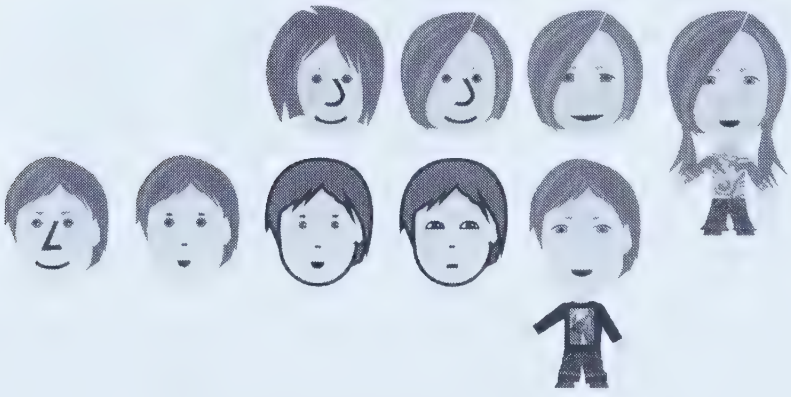


Fig. 29 Development of characters.

Additional features were used to introduce differences among characters, such as colour of eyes, eyebrows and skin, hair, clothing and accessories. By changing the features and details, characters were designed for the testing. Although some ethnic diversity was introduced—different skin colour and eyes shape in the case of the Asian characters—this is considered to be yet in its preliminary stage, and more work needs to be done regarding the inclusion of a wider range of races (Fig. 30). These characters were given names and different nationalities, as would be authentic to a multicultural, worldwide online space. Identification cards were developed, to create a stronger sense of reality and to simulate the *sign-in* process within the reading club (Fig. 31). "Pictures" of the characters are shown in these identification cards, as well as their country of origin, name, age and a short statement of their reading preferences. In addition, an instant picture of each character was designed, which introduces the character in full body and provides a personal comment about the reading club.

Fig. 30 Characters designed for the testing.

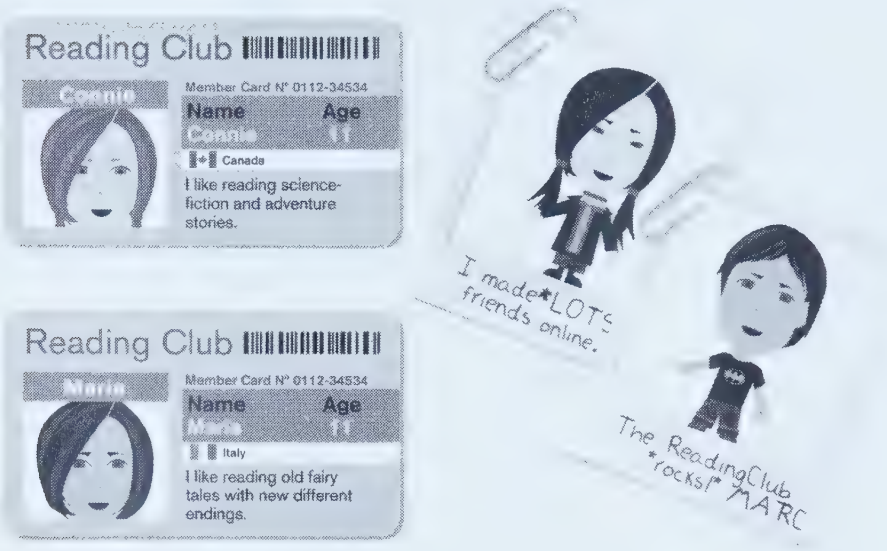


Fig. 31 Identity cards and *instant pictures*.

Discussion tools

The discussion tools were conceived with two main functions: to help structure the messages and to help understand the dialogues on the discussion board. When a participant is composing a message, the tools offer six different possibilities for action. The participant can start a new topic, simply speak up, agree or disagree with someone, create a picture or ask a question. When the messages are already posted on the discussion board, the tools have the function of coding the messages, informing the participants that there are a certain number of topics to talk about, an agreement of ideas, or a question to be answered. The tools help to create and locate opportunities for interaction.

The design of the tools using iconic figures was based on icons commonly used in computer applications. Simplicity in the depiction could avoid children having to learn or memorize the tools in order to be able to use them easily. A flag, a speech balloon, a happy face, an unhappy face, an icon of picture, and a question mark were the icons chosen for the six discussion tools (Fig. 32).

Fig. 32 Designing the discussion tools.

These icons were placed on buttons to resemble the tools found on current computer websites. A label, with the name of the tool, was added in the button to remove any doubts about the function of the tool. The buttons were colour-coded to add another level of meaning to them. Red and orange call attention, green implies *Go!*, blue is informative and yellow shows energy and activity. The use of colour was also intended to help speed in the recognition of messages when they are all mixed on the board (Fig. 33).

Fig. 33 Discussion tools.

- **New Topic** is the tool to start discussions or change the topic. It shows the beginning of a new thread. It operates as a landmark within the discussion space. The red flags indicate starting points.

- **Speak Up** is the tool to talk and to share thoughts, ideas and feelings about the story. The yellow speech balloons show energy and participants engaged in active dialogue.

- **Agree** is the tool to agree with someone else's comment or opinion. When using this tool, children are encouraged to explain why they agree. The happy face suggests consensus, shared opinions, encouragement and the joy of finding coincidences.

- **Disagree** is the tool to express differences of opinion. When using this tool, children are encouraged to explain why they disagree. They are also informed that disagreeing does not mean that the other person is wrong, but thinks differently instead. The neutral face shows disagreement and the orange colour suggests *stop!* or *caution,* warning participants of a possible conflict.

- **Question** is the tool to ask questions. When placed on the discussion board, the question mark clearly shows an opportunity for interaction and a needed intervention. It may inform that someone needs help in understanding something, or that someone is looking for the meaning of a difficult word.

- **Pictures** is the tool to express ideas with images. Children are encouraged to make drawings, maps, charts, or to attach scanned photographs, etc. When placed on the *discussion board* the *Pictures* icon shows that someone has produced an image to contribute to the dialogue.

Organization of discussion toolkit

The premise for the design of the discussion toolkit was that it had to be visually clean and informative to avoid distracting children with purposeless features, but at the same time it had to be appealing. Since the paper prototype would simulate the interface for an online reading club, considerations towards the inclusion of features resembling a website were taken into account. The tools resembling buttons were arranged as a vertical toolbox, an identification card with the information of the participant was added resembling the *sign-in* process, and the space for writing emulated the screen of a computer (Fig. 34).

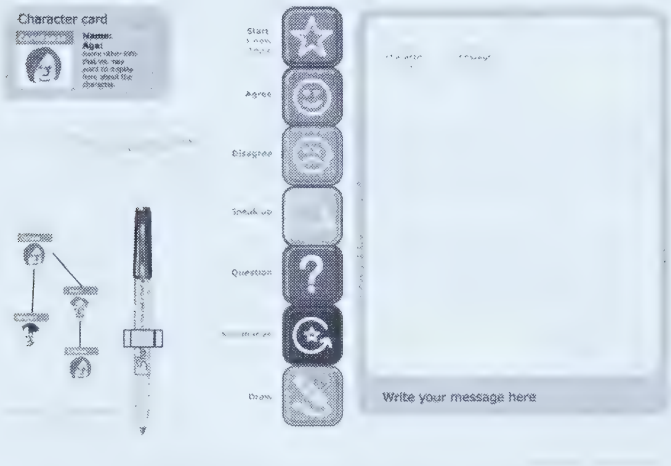


Fig. 34 Second prototype designed to resemble interface features.

The third version of the prototype organized the information more clearly in labeled compartments resembling the tabs or multiple windows seen in interfaces (Fig. 35).

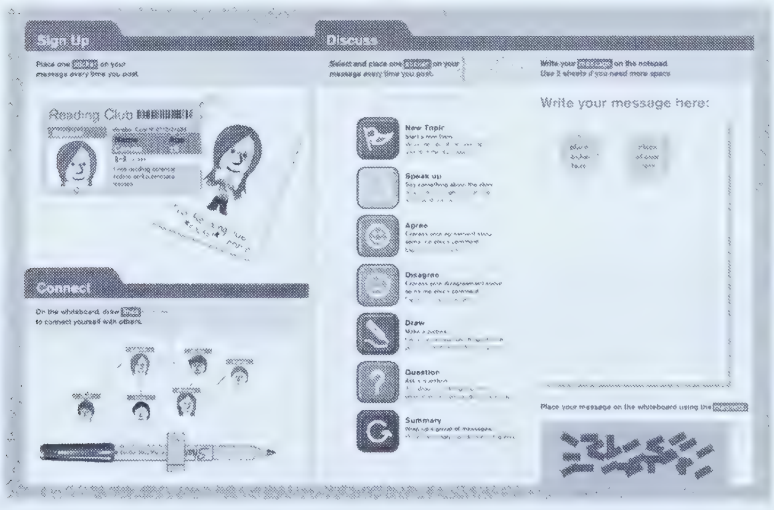


Fig. 35 The third prototype shows the information organized in sections.

The final version of the prototype of the discussion toolkit presents the information arranged in four well-defined steps; these steps are numbered, and the actions are clearly explained (Fig. 36).

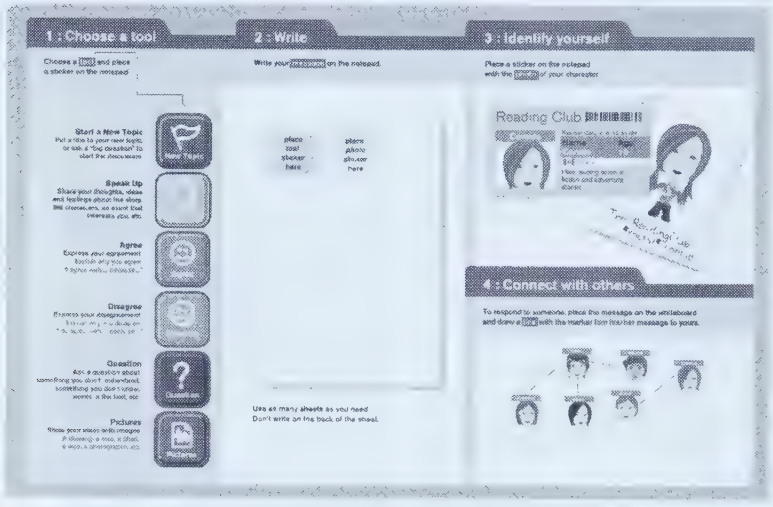


Fig. 36 Discussion toolkit prototype in its final version.

Testing materials

Eleven discussion toolkits were customized with a different character. According to the number of girls and boys in the class, some characters were repeated to reach the number of 23. Two more characters were created to be used by the research assistants (Fig. 37).

Fig. 37 Pictures of the characters designed for the testing.

The discussion toolkits were mounted on foam core board to provide a hard surface that would allow children to sit on the floors and use the toolkits as individual desks. Stacks of stickers for each of the tools and identification pictures and white notepads were attached to the toolkits (Fig. 38).

Five white foam core boards were prepared with a number that would identify each of the groups and signals were created to silently inform about time left during activities (Fig. 39).

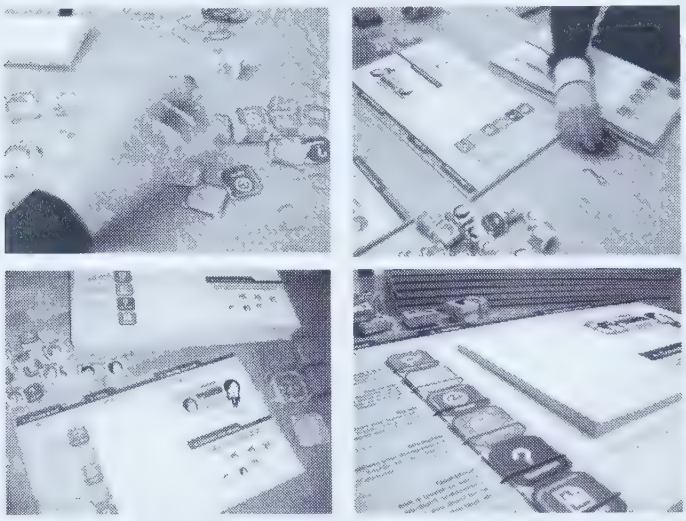
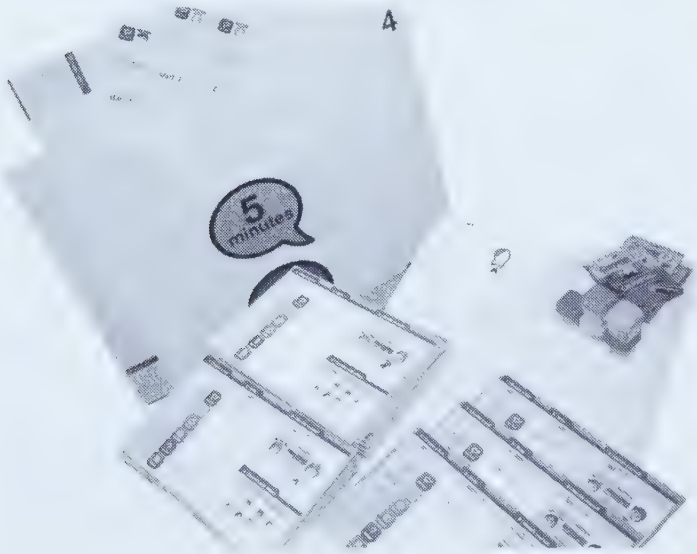


Fig. 38 (above) Assembling the discussion toolkits.
Fig. 39 (below) Testing materials.



Instruction

The instruction planned for the testing of the tools consisted of the selection of a short story as a reading material to discuss during the activities, and a set of topics and questions extracted from the text to be used as starting points or helpers during the sessions.

Short story

The short story chosen for the activity was *Garbage Creek*, from the book *Garbage Creek and Other Stories*, by W. D. Valgardson (see appendix C).

Topics and questions

Professionals in education were consulted at this stage; from these conversations and further analysis of the content of the short story, main topics were extracted and questions intended to stimulate discussion were formulated. The main topics found in the short story were:

- environmental issues;
- research projects: resources, planning, division of tasks, schedule;
- achievement, accomplishment;
- cultural exchange, ancestors;
- friendship, cooperation; and
- family relationships.

The questions formulated in regard to these topics were:

- Have you been in a similar situation to the one Jim and Angie went through? What would you do in their situation?
- What happens when we throw garbage in the environment?
- Can you think of ways to protect the environment?
- Which are the steps when planning a research project?
- Which are the resources they used to research about the salmon?
- "Two can do a lot more than one," said Angie. What do you think of this? Do you agree? Why?
- "Ours," Angie said. "We did it. They wouldn't be here if it weren't for us." What do you think Angie feels? Have you felt something similar?
- What do you think Angie and Jim have in common? And which are the differences?
- "It's not fair," Angie said. "Lots of things aren't fair. They just are," Jim responded. What do you think Jim means?
- "Being a parent is hard work," Jim said.
  Is Jim thinking about the fish? Is he thinking about his parents?

Topics and questions were used to create messages to be used by the research assistants (Fig. 40). In order to provide a consistent beginning of the silent discussion activity for the five groups involved in the testing, the research assistants would start the discussion on the boards of their groups, posting the first message. The other three messages were provided in case the discussion did not evolve and the research assistant considered there was a need for his intervention posting a second, third or fourth message to stimulate discussion.

1. *Topic: The environment.* What happens when we throw garbage in the environment?
2. *Topic: Cooperation.* Angie says that two can do a lot more than one. What do you think of this? Do you agree? Why?
3. *Topic: Friendship.* How did Angie and Jim become friends? What do they have in common?
4. *Topic: Family.* Angie and Jim come from families where their parents are very busy. What do they do to entertain themselves?

To help children start new topics, some tips were added to the discussion boards that showed a list of possible issues or topics (Fig. 41).

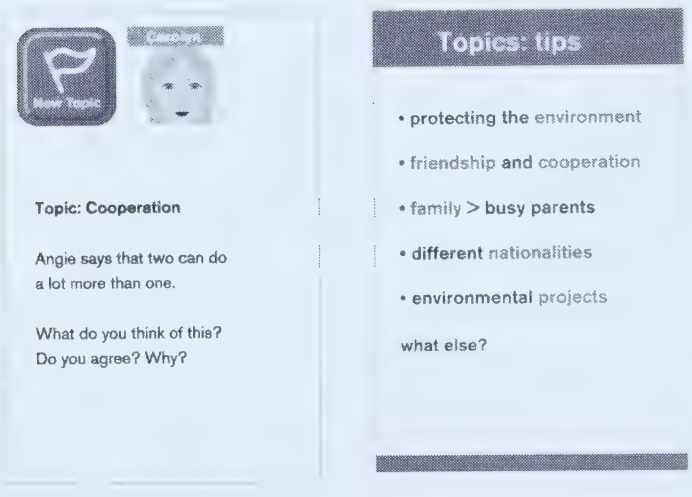


Fig. 40 (left) Research assistant's *new topic* message to start or stimulate discussion. Fig. 41 (right) *Tips* to start new topics.

Design evaluation

STUDY DESIGN

The purpose of this study was to test the performance of a paper prototype of a visual tool intended to facilitate discussion in an online medium. This study simulated an online group discussion about literature. Children's needs regarding tools to aid discussion and discussion dynamics were observed. This study also involved some preliminary qualitative assessment of the effectiveness of this approach regarding motivational aspects. In addition to the main activity, children answered a questionnaire and worked in the development of rapid low-tech prototypes for an online reading club during a participatory design session.

Method

Participants

Twenty-three children (boys and girls) attending the Child Study Centre—13 students in grade five and 10 in grade six—participated in this study. Written consent from parents and verbal consent from children were obtained prior to the study (see appendix B). Participants were given the possibility to opt out and engage in another activity their teacher had prepared for them; throughout the study they were also advised that they had the right to withdraw at any time without any consequence. They were also told that the purpose of the activity was to help the researcher test the performance of the prototype and hence their performance would not be evaluated nor graded (see appendix, B).

Tape recordings and still camera images were used to record the experience, but no names were coded with that data. Children are not identified by name; when the researcher quotes any of the contributions or comments, pseudonyms are used to grant anonymity to participants.

Materials and settings

This study took place at the Child Study Centre at the University of Alberta, during the English Language Arts class. Children worked in groups of four to five students, each group being monitored by one research assistant. All research assistants were graduate students in Visual Communication Design or Psychology. The teacher in charge of the class and his assistant were present, monitoring the activities and making sure that all children were at ease.

Each child used an individual *discussion toolkit* consisting of a tabloid size print mounted on foam core board, notepad and stickers (see appendix, C).

Each group shared a *discussion board*, a 32" x 40" foam core board where they pinned their messages.

School supplies commonly used safely by children were provided in the sessions, such as pushpins, non-toxic pens, pencils and colour markers, paper, scissors and tape.

Role of researchers

The principal investigator introduced the activities of every phase, and conducted the group presentations and discussions at the end of the day. She made general observations, took photographs of all the groups at work, coordinated time aspects related to the activities and made sure that all children and research assistants were at ease.

The research assistants were asked to take notes of what the children said and did, and overall impressions regarding behaviour and motivation. As it was not desirable to disturb children with the pressure of an observer, the assistants were asked to adopt an integrated attitude within the group. They were encouraged to talk to the students, to help them with things they did not understand, and to scaffold their activities if they felt there was a need to do so.

Procedure

The study consisted of four visits to the classroom:

1. **Phase I** was a short introduction performed by the principal investigator, a week before the actual testing began.
2. **Phase II** consisted of an introduction, a silent discussion activity using the prototype, and presentation of the work done to the class.
3. **Phase III** consisted of the completion of a questionnaire, that worked as a means of reflection for the participatory design activity that followed, ending with presentation of the work done to the class.
4. **Phase IV** was a closing discussion conducted by the principal investigator.

Phase I **Day 1: Introduction**

30 minutes

The principal investigator visited the class and introduced herself to the students. The purpose of this visit was to provide a quick introduction about the activity. The principal investigator explained to the students what she was working on and what kind of activity would they do during her next visit (see appendix, B).

She showed them the testing materials, consisting of a *discussion toolkit* each student would use during the experience.

Copies of the short story they would have to read for the following visit were handed out. The chosen short story was *Garbage Creek*, by W. D. Valgardson (see appendix, C). The selection of the reading material had been supervised by Professor Joyce M. Bainbridge, Department of Elementary Education, University of Alberta, who considered the text appropriate for the age group. Children were asked to read the text for the following meeting, and they were also encouraged to think about the reading, write down main ideas and produce and/or collect some materials related to the story (drawing, pictures, etc.). The reading of the text was the only requirement to participate in the activity.

Letters of consent from the parents were collected and children were reminded that they could refuse to participate in the activity if they preferred to do so. No student opted out, on the contrary, they all appeared eager to participate.

Phase II **Day 2: Silent discussion activity**

90 minutes

Introduction 20 minutes

The principal investigator explained to the students that they would be part of an activity similar to what people do in an online reading club (see appendix, B). They were told that they would be able to share their thoughts and ideas about the short story with their group. They were told that they would have to try to communicate without talking, using the set of *discussion tools* provided; and that the discussion would be performed through writing and posting messages on a *discussion board*. The principal investigator showed the discussion toolkit, explained how the tools work and what they were expected to do with them. The principal investigator and a research assistant demonstrated an example.

Silent discussion 40 minutes

The class was divided in five groups of four to five students. Each group got together and the research assistants started the discussions by posting the first message on the discussion board. Children were told that they could add to this topic or start a new one if they preferred. Children were encouraged to comment and to produce written and drawn responses using the discussion toolkit.

Presentation 30 minutes

Each group showed their discussion boards to the rest of the class and explained what they did.

Phase III **Day 3: Participatory design**

90 minutes

Questionnaire 25 minutes

Individual questionnaires were distributed (see appendix, C). The purpose of the questionnaire was to collect responses concerning specific aspects related to the experience, and as means of reflection and focus for the activity that would follow.

Participatory design 35 minutes

Developing rapid low-tech prototypes for an online reading club.

Children worked in groups of four to five students. They were asked to *design* their own website for a reading club. They were asked to think about what tools they would need for discussion and overall organization of the interface. This session was loosely structured to prevent putting constraints in children's creativity. The technique used for this participatory design session was the development of rapid low-tech prototypes using paper and markers (see appendix, D).

Presentation 30 minutes

Each group showed their drawings to the rest of the class and explained what they did.

Phase IV **Day 4: Concluding conversation**

30 minutes

The principal investigator had a conversation with the class with the purpose of collecting responses concerning specific aspects related to the experience and the prototype, and overall impressions.

Data collection

Using tape recorders, still camera, questionnaires, the artifacts created during the discussion activity and the participatory design session, and the researchers' observations, five types of raw data were collected for analysis:

1) field notes;
2) questionnaire responses;
3) photographs and voice recordings;
4) discussion boards; and
5) rapid low-tech prototypes (see appendix, D).

Field notes

The research assistants' notes captured impressions of the different groups, motivational aspects, behaviours and questions or concerns the participants had. Unexpected outcomes related to the use of the prototype were also noted.

Questionnaire responses

The questionnaires collected responses concerning specific aspects related to the experience.

Photographs and voice recordings

Photographs and voice recordings were used to capture the event and proceedings.

Discussion boards

The activity recorded on the discussion boards became the most important source of content as they showed the actual use of the discussion board as space for interaction. They showed children's dialogues and the shared artifacts, and children's use of the discussion tools.

Participatory design drawings

The rapid low-tech prototypes produced by children in this phase had the purpose of demonstrating children's notions of website design, use of language and visual preferences.

CONTENT ANALYSIS

The first stage in the analysis of the data was a preliminary observation with the aim of finding patterns and commonalities that helped to narrow down the material into themes. This first stage helped to determine what kind of information had been collected, to get a feel for the data, and to plan more structured ways to organize it into workable texts.

For this preliminary analysis, the use of the research question as a starting point seemed obvious. The research question focused on the capability of the visual tool to support *interaction*, *collaboration* and *dialogue*, and also in which way does this tool help to facilitate those activities. For the purpose of the analysis, the research question needed to be broken down in its three main components. Therefore, *interaction*, *collaboration* and *dialogue* were arbitrarily isolated and a colour was assigned to each of them for coding purposes (Fig. 42). Field notes, questionnaires, drawings and some transcripts of voice recordings were coded

using this basic procedure, which showed that the division of data in these three main categories was useful for the analysis (Fig. 43).

How can a visual tool for children's online reading clubs facilitate interaction, collaboration and dialogue?

Fig. 42 Research question broken down in three main components.

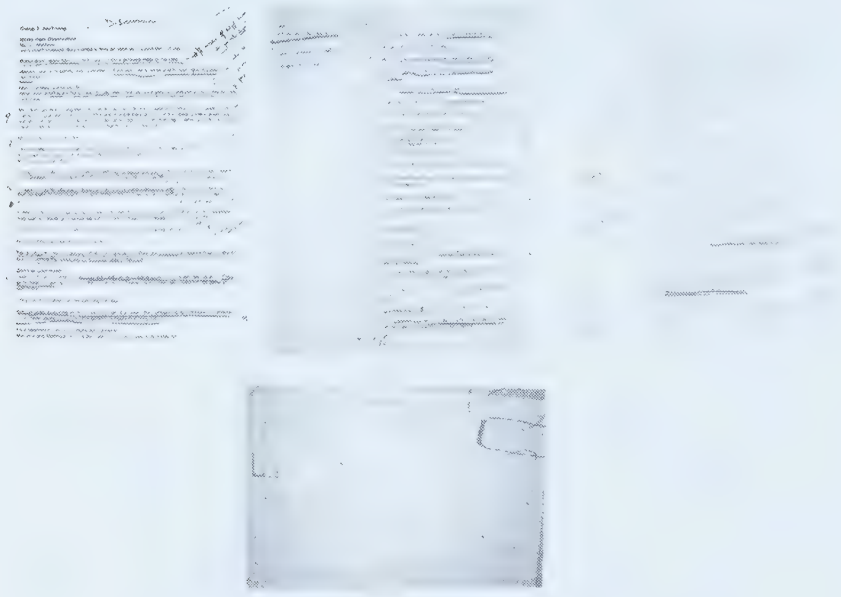
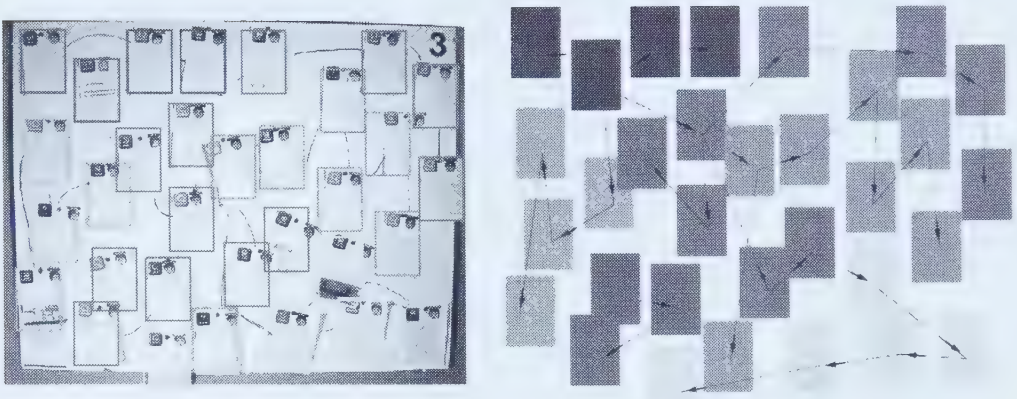


Fig. 43 Coding procedure derived from the research question.
Field note, questionnaire responses, transcript from tape recording and rapid low-tech prototype.

The *discussion boards* presented a more complex case (see appendix, D). Finding the threads of dialogue, identifying them with different colours, and indicating the flow of the conversation with arrows was the first step in the analysis of the boards (Fig. 44, 45, 46). After this, the dialogues were extracted and converted into texts. Each dialogue was assigned a number to facilitate later use (Fig. 47). Having identified the structure of the dialogues, other operations were made possible, such as the synthesis of the dialogues to show only the *discussion tools* that the children had used (Fig. 48; see appendix, D).



Figs. 44 (left), 45 (right) Analyzing the discussion boards.
Finding threads and flow of dialogues.

Figs. 46 Colour-coding threads and indicating flow
of dialogues with arrows.

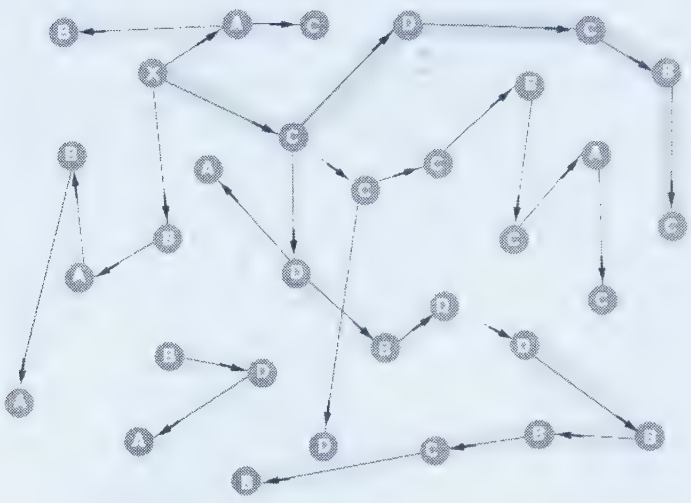
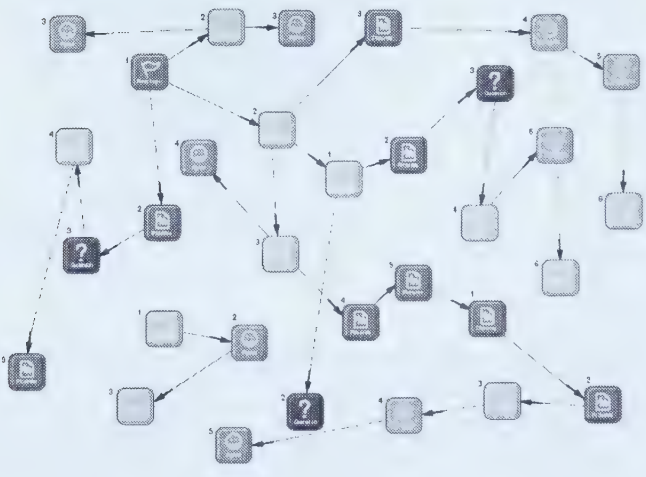


Fig. 47 Each dialogue was assigned a number to facilitate later use.

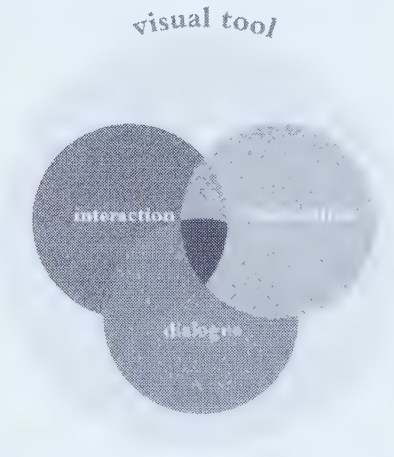


Figs. 48 Different ways of showing the activity in the discussion boards; here, the discussion is synthesized to the discussion tools used in the messages.

Enough material started to appear with these observations, but given the diverse nature of the data, the need for a more structured way of organizing the material became apparent.

Framework and integrative model

The three components of the research question, *interaction*, *collaboration* and *dialogue*, became the basis for a *framework* created for a more profound analysis of the data. The framework was organized in three main categories. The expected outcomes, from the testing of the tool, were located under each one (Fig. 49 in *foldout*). The research question was broken down arbitrarily for the purpose of deeper analysis, bearing in mind that in reality, the three components work as an interrelated whole (Fig. 50).



Figs. 50 Graphic that shows the three components working as an interrelated whole.

Using the framework, the data were organized into three understandable groups by a thorough process of sorting and categorizing pieces of information (Figs. 51, 52). The aim of this stage was to look for examples in the data that illustrated each of the expected outcomes, as well as uncovering unexpected ones. As a result, an *integrative model* was developed, which permitted the comparison, integration and analysis of the five different types of data in one chart (Fig. 53).

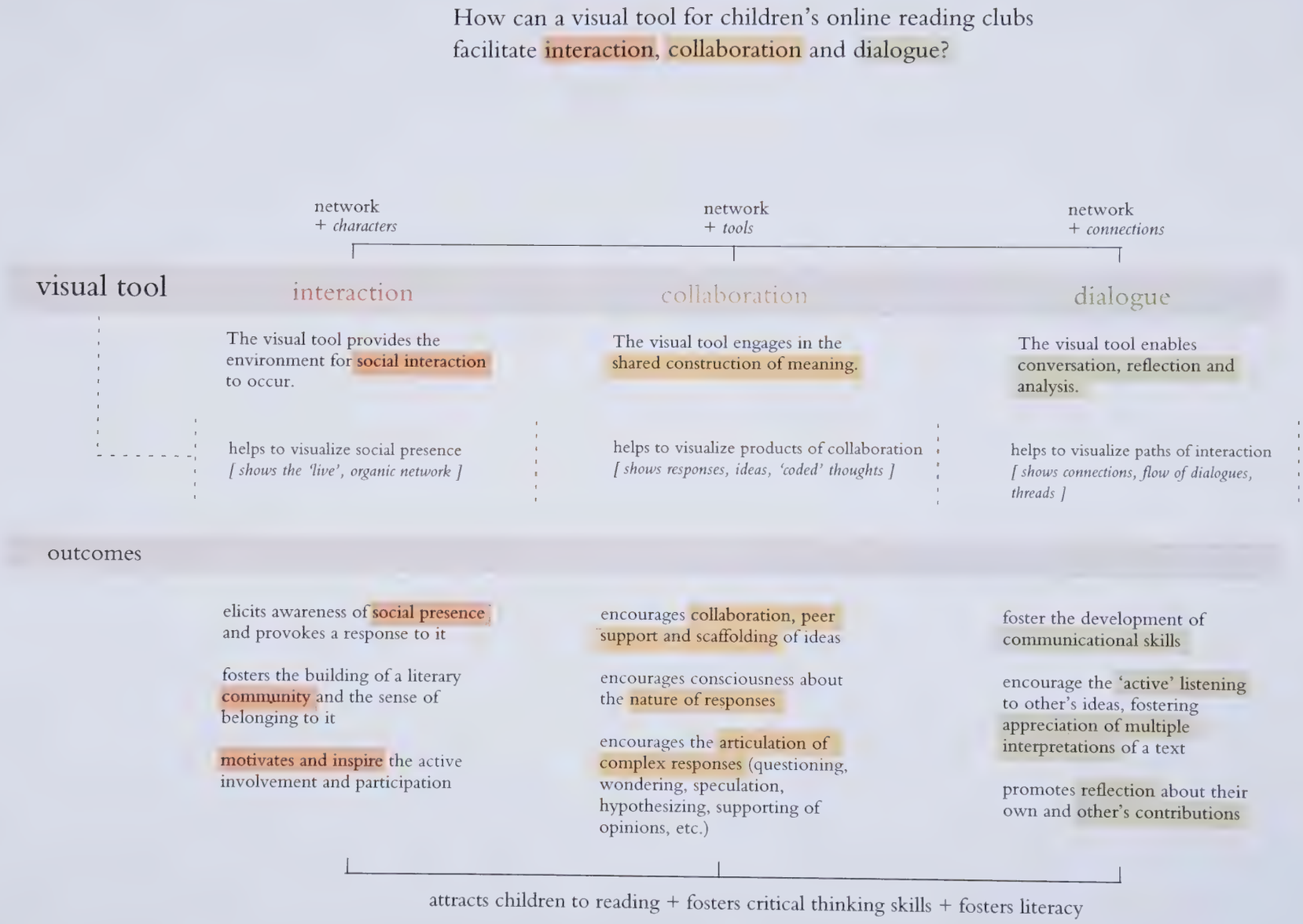
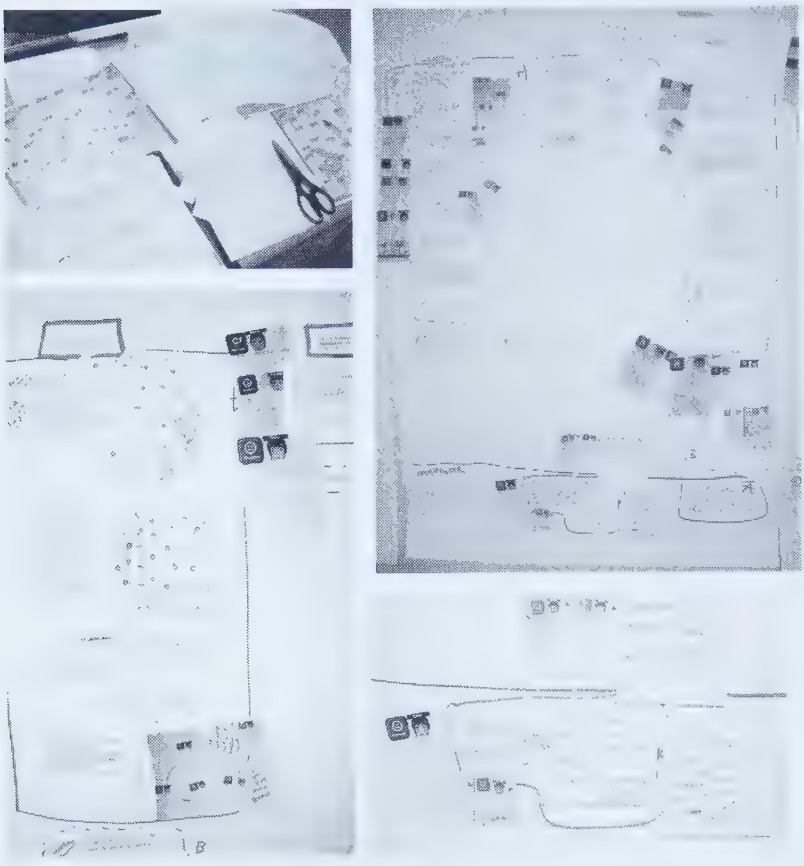
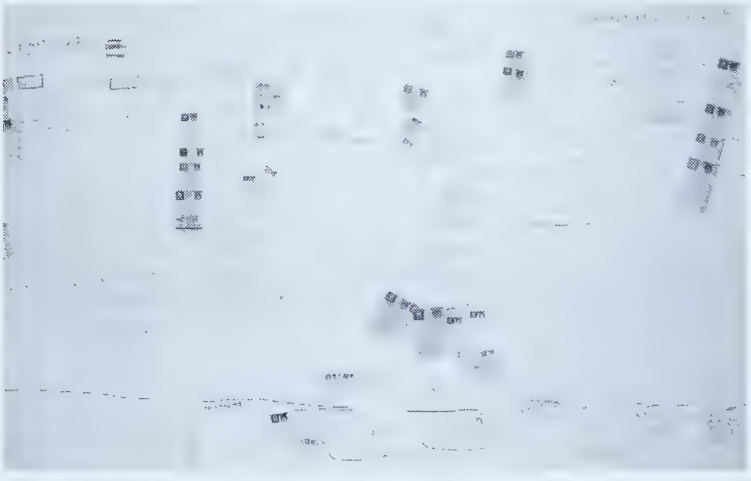


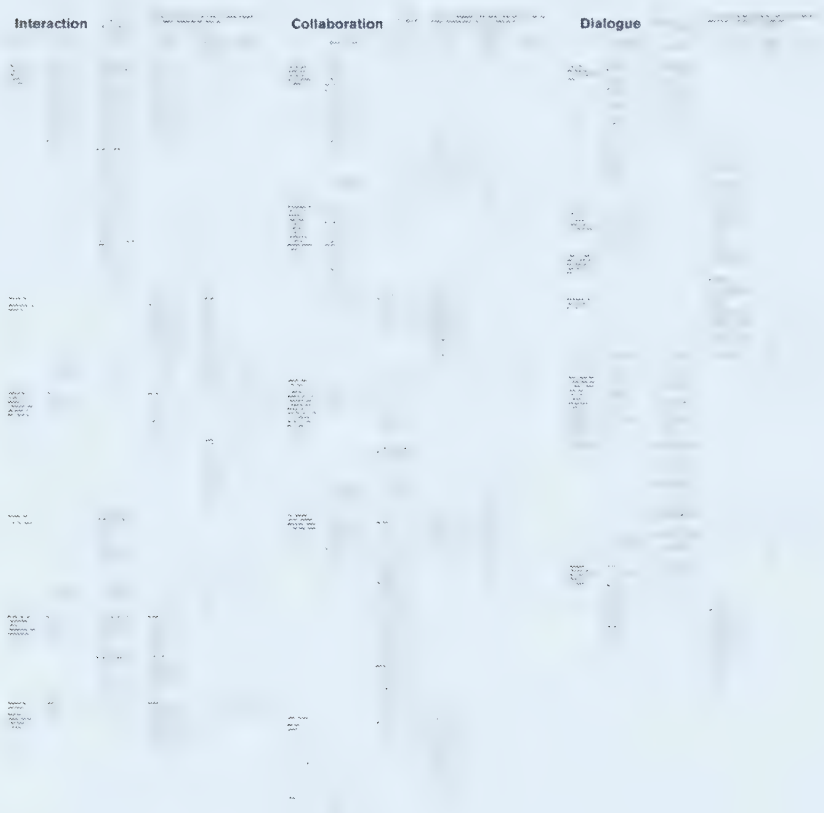
Fig. 49 Framework created for the analysis. It breaks down the research question in its three main components: interaction, collaboration and dialogue.



Figs. 51 Sorting, categorizing and organizing data into workable groups.



Figs. 52 Data organized according to the three components of the framework: interaction, collaboration and dialogue.



Figs. 53 Integrative model for comparison, integration and analysis of five types of data (*see foldouts in following pages*).

Interaction

network
+ *characters*

The visual tool provides the **environment for social interaction** to occur. ***It helps visualize social presence.***
> It shows the 'live', organic network

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Elicits awareness of social presence and provokes a response to it.	**dialogue 3–G1** One child is 'chasing' another in the board. He's bugging him about spelling. There's a strong sense of physical presence. **dialogue 6–G2** One dialogue occupies almost the whole board. The discussion is not very deep, fast postings. It seems like seeing that everybody is posting, that the network grows, excites them. **dialogue 8–G2** One child posts a question. He gets upset because nobody answers to him. He knows there are people there, he see them posting somewhere else. He complains and get the answer. **dialogue 9–G2** The tone of the dialogue is the one of a real face-to-face conversation.	**Q4: Did the discussion on the board help you see who was talking?** • Yes, you could identify it because of the photo ID. • Yes, because you can see everybody's names. • Yes, because of the 'photos' of people made it clear to see. • Yes, because I knew who had each different face. **Q6: Are the tools easy to understand? >Question** • Yes, because that's how I could ask people all over the world, questions! • Yes, because if you are curious and need to ask a question, you can post it and it would be open to all. **Q8: How did you like the drawings of the children to identify yourself during the discussion?** • [Very much] Because they are all different, you can identify yours. • [Very much] They all have very distinguishable features, such as hat, hair, and shirts. • I liked the characters a lot. • They are life like names. • Very much so, it was cool to kind of be someone besides you. • ...it could be improved by getting more characters • I think is a good idea to pick your own character. • It would be nice to make your own person. • I wish we could make our own. **Q9: What would you like to use to identify yourself in a reading club on the internet?** • Photo/drawing: Because it is easier to know who's talking. • A card like the one on the board. • Photo/name • A cartoon like the ones we used	**assistant–G1** *"I began with the first post. Group leaned forward to read the post."* They react to presence. **assistant–G1** *"Very little physical or facial communication between participants."* It appears that more visual cues are not needed. **assistant–G3** *"Lines seemed to help them remember who they were interacting with. It guided the direction of their remarks to a specific person."* The fact that 'helps them remember' confirms that the visual tool show connections that otherwise would be hidden or unknown.	• Customization of characters 18, 19, 20, 21(22?)	
Unexpected **Reinforcing live presence**			**Drawing attention to postings:** **assistant–G2** *"They tap to draw attention to postings."* **assistant–G3** *"Kids avoided speaking as much as they can. But when they answered to someone's comment, they made a sound or nudge the person to notify that they did so."* Need show more live updating of presence and interaction.	**Other elements to show live presence:** 2 empty/full/leave discussion /who's talking now 6 Mary has answered! /button 10 people on 14 Find out who's online 16 Currently 4 users 18 Look for friends 19 Welcome Chris!	

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Fosters the building of literacy community and the sense of belonging to it	**dialogue 4–G4** Children set the rules of conduct and behavior within the reading club, what contributes to the community building. "Stay on topic", "This is not a chat room. It is an online reading club."		**assistant–G2** *"Children were very good at policing themselves and telling each other to get back to topic."* Children set the rules of conduct and behavior within the reading club, what contributes to the community building. **assistant–G2** *"All children were interested in being interconnected."* Interconnectedness as group forming.	• **Club, membership, community** • Name as community's identity: 1, 5, 6, 7, 10, 11, 12, 13, 15, 17, 19, 20, 22 • You are Welcome to this community! • Security issues to protect the community: sign in, passwords, becoming a member, private chat rooms.	[child talking about people joking around and going purposely off topic] Child 1: "...obviously the person don't want to talk about it... so you can just have like a 'disconnect' button..."

Unexpected

Security Issues

Q12: Would you talk to kids from other places in a reading club on the Internet?

- The weird things and viruses on the Internet don't exactly make me feel secure. I'd participate in class.
- As long as they don't know much about me.

Q13: Do you participate in clubs online, forums, chat rooms, etc.?

- No, because I don't know what's on them.
- No, my mom won't let me.

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Motivates and inspires the active involvement and participation.	**dialogue 3–G2** Everybody eagerly participating. Each dialogue in this group has contributions from the four participants.	**Q1: Did you enjoy the activity?** • [Very much] I like writing and it was fun communicating. • [Very much] because it was fun to talk to other people online… • [Very much] because it was fun • I liked it a lot **Q12: Would you talk to kids from other places in a reading club on the Internet?** • Yes, so I could meet more people • Yes, because I like learning about different cultures. • Yes, it would be fun to see what is it like there. • Yes, it would be fun to learn how they live	**assistant–G1** *"I began with the first post. Group leaned forward to read the post."* They react to presence. **assistant–G1** *"Very little physical or facial communication between participants."* It appears that more visual cues are not needed. **assistant–G3** *"Lines seemed to help them remember who they were interacting with. It guided the direction of their remarks to a specific person."* The fact that 'helps them remember' confirms that the visual tool show connections that otherwise would be hidden or unknown.		
Unexpected outcomes **Shallow conversations; 'msn' type of dialogue**	**dialogue 4–G2** **dialogue 5–G2** Dialogue gets truncated. Conversations go to fast, they get bored and abandon the dialogue.	**Q1: Did you enjoy the activity?** • Sort of it was more fun than learning.	**assistant–G2** *"Very eager to participate. Trying to post messages as quickly as possible."* This group showed a massive amount of postings but a low quality of responses. It appears as though the online character of the activity took over. Could it be that they are used to the computer as a medium to have fun and shallow conversations? Do they have strong preconceived notions about chat rooms and talking online?		[talking about being off topic] Child 1: "…we wanted to joke around… we just wanted to talk…"

Interaction

network
+ *characters*

The visual tool provides the **environment for social interaction** to occur. ***It helps visualize social presence.***
> It shows the 'live', organic network

Collaboration

network
+ *tools*

The visual tool **engages in the shared construction of meaning.**
It helps visualize the products of collaboration.
> It shows responses, ideas, 'coded' thoughts

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Encourages collaboration, peer support and scaffolding of ideas	**dialogue 4–G3** **dialogue 6–G3** **dialogue 1–G1** **dialogue 5–G4** **dialogue 1–G4** Sharing ideas. Each child adds something that contributes to the building of meaning. **dialogue 2–G3** Mariana interprets graphically Matthew's idea. Collaboration. **dialogue 2–G2** Frances prompts Maria to expand. Dong completes the idea. **dialogue 1–G1** Marco encourages Frances complimenting her.		**assistant–G1** *"Girl participant was very apprehensive in posting. She appeared shy. She didn't post much. She was the first to draw a picture. The picture was complex. Participant Marco commented positively about the drawing. It appeared as though he was offering support to the girl by complimenting the drawing to encourage her to participate."*		

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Encourages the articulation of complex responses (questioning, wondering, speculating, hypothesizing, supporting of opinions, problem solving, etc.)	**dialogue 3–G3** Mariana questions. She pushes the idea. She also scaffolds other's ideas. **dialogue 1–G5** Group problem solving. The solution comes as a product of the dialogue. Two ideas that end in a third one. **dialogue 4, 5, 6–G5** **dialogue 2–G4** Asking for clarification… **dialogue 5–G1** Making connections with their lives. **dialogue 4–G1** Supporting of opinions. Marco defends his idea. Picture tool helps children to express	**Q1: Did you enjoy the activity?** • I enjoyed it because we got to express our feelings **Q6: Are the tools easy to understand?** **>Picture** • Yes, to get ideas. • Yes, necessary to understand better. • Yes, I thought this was easy to link to others. • Yes, because sometimes it is easier to explain with drawings instead of words.	**assistant–G3** *"I didn't think that they would draw so many pictures. I felt that them were a good icebraker for kids. They drew pictures when they did not know what to say. It seemed to have given them a good break from writing."* Picture tool helps children to express themselves. Powerful tool for shy students. Powerful tool to clarify ideas (several examples!) **assistant–G4** *"Connie was one of the special needs student; but she did a picture…"* **assistant–G5** *"One child (special needs student) makes only drawings."*		

Unexpected – Off topic **To start with a question about the environment was a mistake. However, the experience is valid. They don't talk specifically about the story, but yes about other topics.**	(examples from G2??) **dialogue 7–G4** At the end, this group goes completely off topic. They get bored? The conversation shifts to a completely different topic.	**Q2: Did the discussion help you understand the story better?** • No, I understood the story already. • Well, I understood the story already. • It made me forget the story. • It did not help because we went off topic a lot. • No, we were just talking about it and that doesn't help. • No, we weren't actually talking about the story. We were just talking about the environment **Q3: Did the discussion help you realize of things in the story that you hadn't thought before?** • No, we were off topic			C: Why do you think you went off topic? Child 1: 'cause we wanted to joke around… we just wanted to talk. Child 2: Maybe, hum… because we didn't like the story?

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Encourages consciousness about the nature of the responses	In all cases the tools are used properly and they demonstrate how powerful they are to elicit responses. The tools create opportunities to participate. The tools help them to shape their responses. (some examples) **dialogue 7–G1** agree **dialogue 6–G4** question, speak up, agree (more…?)	**Q6: Are the tools easy to understand?** **>New Topic** • Yes, because it gives lots of things to do. • Yes. It was good to start new • Yes, because that way you know what the people are talking about. • Yes, because it clearly states the person wants to talk about something else. • Yes, because if we get bored of one topic we can suggest a new one. **Q6: Are the tools easy to understand?** **>Agree / Disagree** • Yes, because it was easy to agree/disagree • Yes, you agree/disagree simply. • Yes, if you want to agree/disagree, you can. • Yes, I found this a good way to express my feelings. • Yes, it made simple to say yes/no (and not too hard). • Yes, because it is easy to understand that the person share the same idea./doesn't have the same opinion. • Yes, because I think it is very helpful to explain why you agree/disagree. **Q6: Are the tools easy to understand?** **>Question** Yes, because if you put that up, somebody will know that you don't understand something **Q6: Are the tools easy to understand?** **>Picture** • Yes, to get ideas.	**assistant–G3** *"In few instances they put a tool sticker but peeled it off to change to another tool. For example, they start wanting to speak up but change to disagree instead."* The tools help them to shape their responses. Making them more accurate. Pushing them further.	Recalling the tools during the participatory design session (visual examples) 4, 6, 7, 10, 11, 19, 21 Tools as buttons without icons, only text: 1, 12. (other pages with everything in text…) Other tools they need: • Answer • End Discussion (>summary?)	
Unexpected **New topic /**	(Visual examples)	**Q6: Are the tools easy to understand?** **>New Topic** • No, because instead we used speak up. • I never used it because I started everything with a question.	**assistant–G1** *"One participant made a mistake with the stickers when posting a message but then changed it by putting a new sticker. The mistake was that the participant posted a new topic as a question."* Many people started new topics as questions; they seem to understand what 'new topic' means, not matter if it's stated as a question or no. Some		
Question vs. speak up	(Visual examples)		**assistant–G2** *"Questions were mostly asked using speak up instead of question. Questions about the story itself were asked as question, however, clarification were as speak up."* Differentiation of task vs. non-task talk.		
Disagree	(Visual examples) **dialogue 8–G4** disapprove behavior **dialogue 7–G4** upset about an idea The use of disagree tool to express mood or feelings, instead of using it for its original purpose. I disagree, I disapprove, I'm upset.				

Collaboration

network
+ *tools*

The visual tool **engages in the shared construction of meaning.**
It helps visualize the products of collaboration.
> It shows responses, ideas, 'coded' thoughts

Dialogue

network
+ *connections*

The visual tool **enables conversation, reflection and analysis.** ***It helps visualize the products of collaboration.***
> It shows connections, flow of dialogues, threads

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Foster the development of communicational skills	**dialogue 1–G3** **dialogue 1–G2** The tools enable conversation. Agree is a powerful tool in shaping conversations. **dialogue 6–G1** Asking questions, answering, being polite. **dialogue 3–G5** **dialogue7–G2** Question or New topic as seeking for conversation. **dialogue 8–G1** Martin asks a question that it gets an incomplete answer. Frances re-state the question seeking for a complete answer. **dialogue 3–G4** Matthew starts a new topic. He has something to say, but he wants to engage the others in conversation. He let people talk and then disagree. **dialogue 5–G2** **dialogue 4–G2**	**Q4: Did the discussion on the board help you see who was talking?** • Yes, because you could see who was talking to whom. • Yes, with the help of the lines. • Yes, the lines were easy to read. • Yes, I found it easy the talking to each other. • Yes, because of the lines • Yes, with the lines. • Yes, because of the lines. They're easy to track who was talking.	**assistant–G2** *"Very eager to participate. Trying to post messages as quickly as possible."* *"They are adapted very well to using this as a form of communication. Watching them I felt it was an online experience. The speed of messages, and the kind of messages too…"*		
Unexpected **The network provides a space for individual reflection.** **If they don't find where to participate, they create new opportunities for action.** **The network creates opportunities for later action.**	**dialogue 3–G4** Matthew starts a new topic. He has something to say, but he wants to engage the others in conversation. He let people talk and then disagree. He almost talks by himself… The board allows for individual responses as well. A space for individual reflection or elaboration of responses.		**assistant–G4** *"Matthew ignored what was happening with the other two boys and began to have a discussion by himself. He brought up really interesting things about the story."* **assistant–G3** *"Some of the kids put their comments without connecting the line. When the reason was asked, they answered it is because their comment did not fit into any other comments on the board."* **assistant–G3** *"For a long time no one answered Martin's question. When the discussion cooled down a little bit, Marco spotted the unanswered question and answered it."* **assistant–G1** *"Participants were slow to get started but eventually one participant posted a message. All participants resounded by leaning forward to read the message then sat back down. One participant responded after about one minute."* *"I did post a second topic at one*		

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Encourages the 'active' listening to other's ideas, fostering appreciation of multiple interpretations of a text. >they don't show precisely appreciation of multiple interpretations of THE TEXT, because they didn't talk much about the story… However, they do show appreciation of different points of view related to other topics.	**dialogue 7–G5** One question gets two different answers. **dialogue 5–G3** Marco provides support for his opinion, expressing he thinks differently. **dialogue 7–G3** Matthew changes his mind after Marco express his different point of view.	**Q1: Did you enjoy the activity?** • It was fun to see everybody's ideas. • It was good to know people's opinions… **Q2: Did the discussion help you understand the story better?** • It did help because everybody knows a part of the story. • When people answered your questions you could understand the story better. o No, but it told me other people's understandings. **Q3: Did the discussion help you realize of things in the story that you hadn't thought before?** • Yes, because they looked at the story in a different way than me.			

- Yes, because when I read a story I didn't think of some of our topics.

Q6: Are the tools easy to understand? >Question

- Yes, it helps to know what peeps are thinking.
- Yes, this helped me get other's opinions

Q12: Would you talk to kids from other places in a reading club on the Internet?

- Yes. It's fun. You can get to know different people and their opinions.
- Yes. It would be fun to know what

	Discussion game *dialogues*	Survey *questionnaires*	Field notes *assistants*	Participatory design *drawings*	Conversation
Promotes reflection about their own and other's contributions	**dialogue 5–G3** Marco provides support for his opinion, expressing he thinks differently. **dialogue 7–G3** Matthew changes his mind after Marco express his different point of view. **dialogue 2–G5** Hyun changes her mind after listening to Mariana. **dialogue 2–G3** **dialogue 3–G3** **dialogue 6–G3** Mariana shows reflection about other's contributions, producing very thoughtful responses.	**Q1: Did you enjoy the activity?** • It was fun to see everybody's ideas. • It was good to know people's opinions…	**assistant–G3** *"Mariana was very careful with everything. It took her time to write and to read other people's comments."* The use of tools and the network slow down the process of producing a response. They have time to reflect and be more conscious about their responses. This is a GREAT example of this. The assistant says that Mariana is very careful, and the analysis of Mariana's posting shows that she produced very deep contributions. She prompts her classmates to push forward an idea. She doesn't start them, but by making appropriate questions, she pushes the idea further. (visual examples) dialogue 2–G3 dialogue 3–G3 dialogue 6–G3		

Dialogue network + *connections*

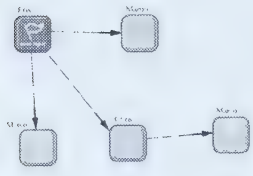
The visual tool **enables conversation, reflection and analysis.** ***It helps visualize the products of collaboration.***
> It shows connections, flow of dialogues, threads

DISCUSSION

The findings are organized according to the three categories created for the analysis: *interaction*, *collaboration* and *dialogue*. Examples that show how the visual tool appears to facilitate discussion by supporting interaction, collaboration and dialogue will be presented. Other features encountered in the analysis that do not belong to any of the three categories, and unexpected outcomes will be discussed at the end.

Note: Support for the findings presented in this discussion are illustrated using excerpts from the dialogues (with emphasis in bold by the author), quotations from questionnaires, and a diverse range of images. The images presented fall into the following classifications and correspond with the sample images numbered below:

(1) a synthesis created by the author to show the dialogues and the tools used in the messages;
(2) a synthesis created by the author to show the flow and direction of children's dialogues;
(3) illustrations created by the author where the characters change in size to stress various points;
(4) material produced by children during the testing (messages, drawings and rapid low-tech prototypes); and
(5) photographs of children at work during the testing.



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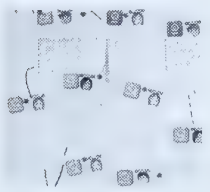
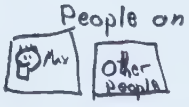
2

3





4

5

Expected outcomes

Interaction The analysis of children's interaction during the silent discussion sessions, survey, drawings and assistants' observations showed that the visual tool may succeed in providing the environment for social interaction to occur. By helping children to visualize the interactions, the visual tool (1) elicits awareness of social presence and provokes a response to it; (2) fosters the building of a literary community and the sense of belonging; and (3) motivates and inspires active involvement and participation.

1. The visual tool elicited awareness of social presence and provoked a response to it

Children perceived the presence of others actively participating in the discussions. They could see how discussions grew; they could *hear* the noise of people chatting in the silent discussion, visualized as characters connected to each other, happy faces showing approval and unhappy ones indicating disagreements. Questions, answers and new ideas were constantly appearing on the board, showing a group of people at work (Fig. 54).

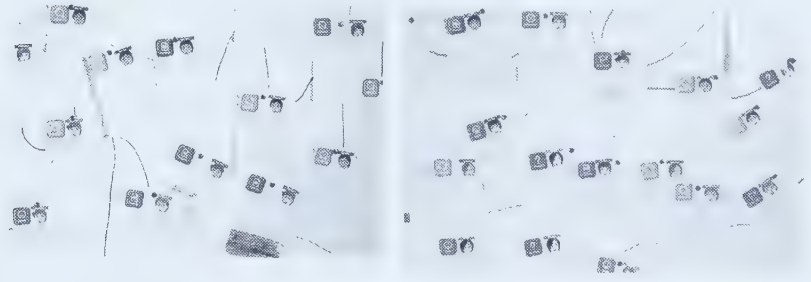


Fig. 54 Section of the discussion boards (groups 3 and 4).

Discussion board *Seeing the pictures of the participants and the connections among them on the discussion board appears to help children to follow the discussions. Seeing the dialogues mapped could reinforce the idea of presence, create opportunities for interaction and motivate children to participate. Examples follow.*

- The posting of messages on the discussion board provoked an immediate physical reaction of leaning forward to read what has been posted. As if they were really talking in a face-to-face situation, children paid attention to each other and considered a response (Fig. 55).

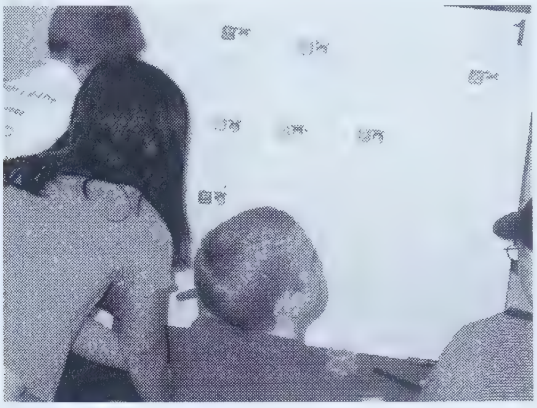


Fig. 55 Children reading their peers' posting on the discussion board.

- Children's answers to the questionnaires indicated that the visual character of the discussion helped facilitate communication and interaction. "Yes, [the discussion on the board helped me] because the 'photos' of people made it clear to see [who was talking]," commented one child. Another child explained that the discussion on the board helped him "because you could see who was talking to whom."

- The possibility of arranging the messages according to whom they were talking to might have enabled the building of threads, facilitating also the grouping of messages according to topic.

- The placement of messages on the board also succeeded in emulating a face-to-face situation, helping to create the illusion of a group of people talking and reinforcing the sense of presence in the online environment (Fig. 56). In some cases, the sense of presence on the board became almost physical, as seen in Fig. 57, where *Chris* is questioning *Marco* about spelling issues. The visual result on the board shows not only connection between two people engaged in dialogue, but also action, movement and progression.

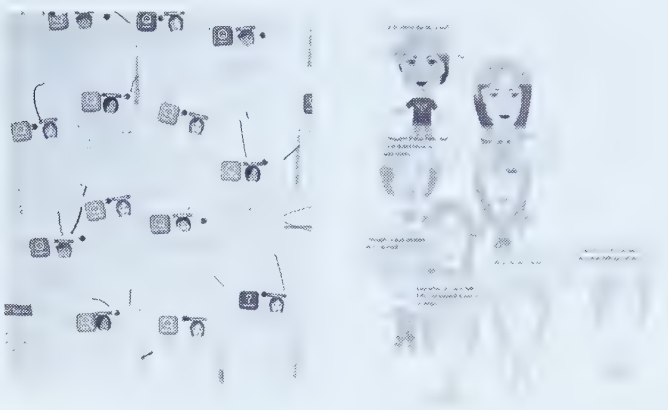


Fig. 56 The proximity of messages on the board could have helped create the illusion of a group of people talking.

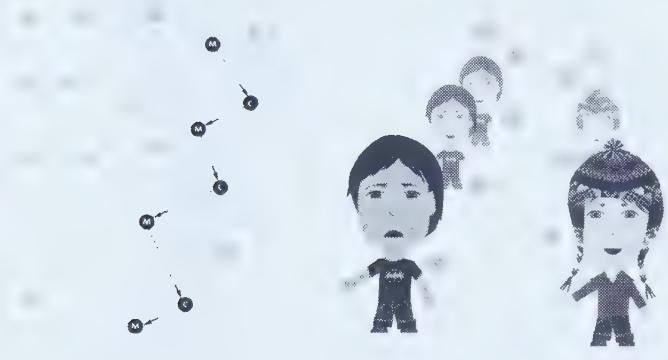


Fig. 57 The depiction of the dialogue between these two children becomes almost physical on the discussion board [dialogue 3, group 2: text below].

MARCO	*speak up*	I think your picture is very cool and 'realistick'.
CHRIS	*speak up*	You spelt 'realistik' wrong Marco.
MARCO	*disagree*	What I meant by 'realistick' was that that is what really happens.
CHRIS	*disagree*	You still spelt it wrong.
MARCO	*speak up*	You 'spellt', 'spellt', 'spett'...
CHRIS	*question*	What does 'spett' mean?
MARCO	*speak up*	'Beats' me.

DIALOGUE 3, GROUP 2

- The possibility of seeing the network in constant activity and growth may have helped the perception of presence. In the following example, the sense of presence becomes evident: *Martin* demands attention after asking a question and not getting an answer. He knows there are people listening because he sees them posting messages. "Can someone answer my question?" he complains, as if he were trying to be heard within a group of people chatting (Fig. 58).

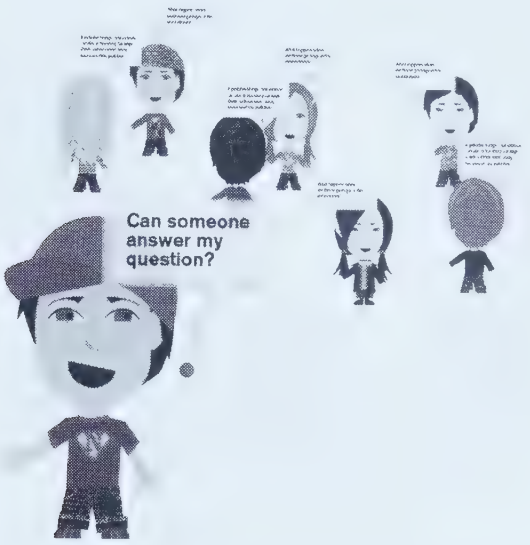


Fig. 58 *Martin* sees everybody *talking* on the discussion board and he complains when nobody answers his question [dialogue 8, group 1: text below].

MARTIN	*question*	What were the character's names?
MARTIN	***speak up***	**Can someone answer my question?**
MARCO	*speak up*	The girl's name was Angie but I don't know the boy's name.

DIALOGUE 8, GROUP 1

Immediacy and update

Being able to see the immediate update of responses on the discussion board could help to create awareness of social presence and facilitate the flow of the dialogues. Examples follow.

- The immediacy of the replies may have reinforced the sense of presence. When the exchange of messages was fast, the tone of the conversations was casual, almost like a real face-to-face conversation. Group 2, in particular, experienced this fast exchange of messages. The research assistant for this group commented that while watching the children communicate he felt it was an online experience because of "the speed of messages, and the kind of messages too." He also observed that they appeared to be very well adapted to using this tool as a form of communication (Fig. 59).

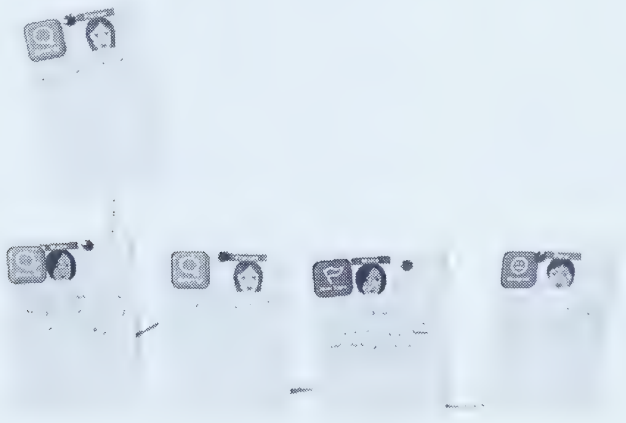


Fig. 59 The tone of the dialogue is natural and casual
[dialogue 6, group 2: text below]

MARIA	*speak up*	I found hard to know who was talking, did you?
DONG	*disagree*	I found it easy. I imagined them with their different words and vocabulary, plus the story said who was talking.
FRANCES	*speak up*	What do you mean?
MARIA	*speak up*	Like when Jim was talking I did not know if it was him or Angie.
FRANCES	*speak up*	Now I get it!

DIALOGUE 6, GROUP 2

- The importance of showing "live presence" and update was strong during the discussion activities. Two research assistants observed that children in their

groups needed to notify the rest that they had posted a new message on the board. While some tapped the board to draw attention to their postings, others made a sound or nudged the person they were communicating with.

Many interesting elements in reinforcing presence were identified later in the children's drawings. This first example shows an alternative to the tapping on the board. A sign on the screen notifies the person that someone has answered his question (Fig. 60).

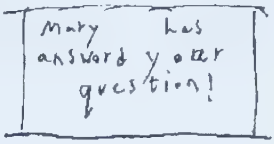
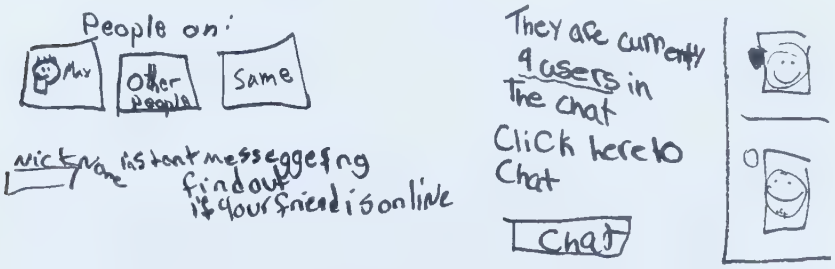


Fig. 60 A sign gives immediate information about postings.

Knowing who is online appears to be important for many children. "People on," "There are currently four users," and "Find out if your friend is online" are among the choices they used in their drawings (Fig. 61).

For some children, the website was a *space* where we enter, a space that could be *empty* if there are no users online. In these cases, the concept of physical presence becomes strong: the space reacts to our presence, welcoming us when we sign in (Fig. 62).



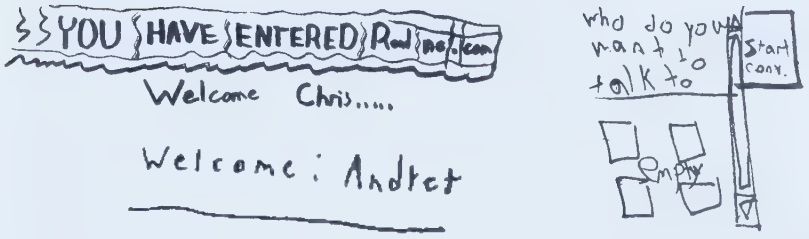


Fig. 61 (top) Different ways of showing who is online.
Fig. 62 (bottom) The *space* reacts to our presence.

Characters *The self-identification feature reinforced the identity and hence the sense of social presence. The characters helped children to see themselves and the others with whom they are interacting within the virtual space.*

- The use of cartoon-like characters to represent themselves during the discussion received unanimous acceptance among children. They expressed in the questionnaires that they liked the characters very much: "because they are all different, you can identify yours;" "because they all have very distinguishable features, such as hat, hair, and shirts;" and "because they are 'life-like' names" (Fig. 63).

Fig. 63 The characters helped children see with whom they were talking.

- Several children requested customization of characters: "I think is a good idea to pick your own character;" "It would be nice to make your own person;" "I wish we could make our own;" and "[To identify myself I would like to use] a cartoon like the ones we used today, only it would look like me" were some of the children's comments regarding features for self-identification.

  During the participatory design activity children included in their websites a "make-your-own-character" section. Some of the titles they chose for this section are: "Character assembly;" "Character making;" and "Pick-A-Person or Create-A-Person" (Fig. 64).

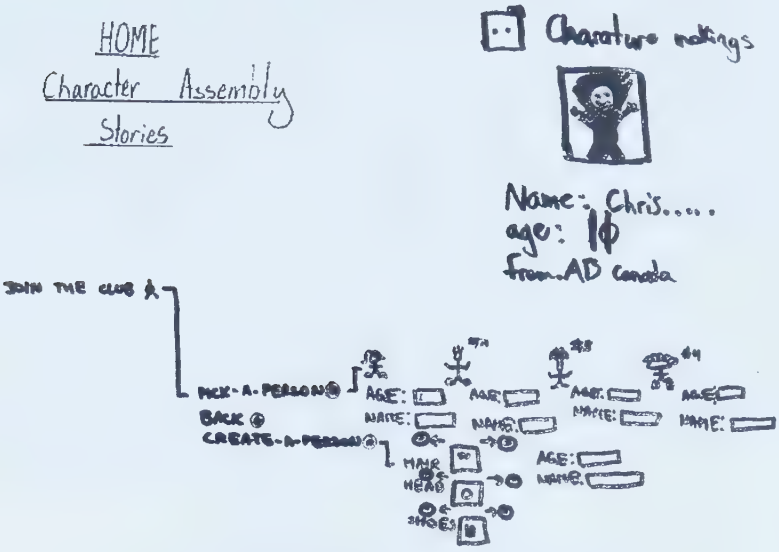


Fig. 64 Children's drawings showed customization features.

2. **The visual tool fostered the building of the community and the sense of belonging**

Children were eager to be interconnected with others; multiplicity of lines connected one message to many others. They wanted to "tell to a lot of people," as one child answered the question of why she connected her message to more than one person. The network as it grew "knitted" the group together facilitating the building of the community (Fig. 65).

Fig. 65 The network helped to build the community.

Identity, membership, security issues and rules

The identity of the online club, as well as membership, security issues and clear rules of conduct and behaviour appear to help in building a sense of belonging to a community. Examples follow.

- Children appeared to be very aware of identity issues. The branding and naming of these websites appeared in all their drawings. Some of them even designed logos for their sites (Fig. 66).

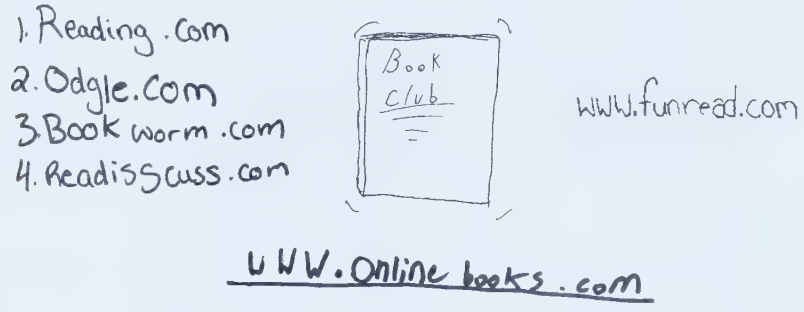


Fig. 66 Branding and naming.

- "Joining the club" seemed to be important for children. Memberships and *sign-up* procedures appeared to help in reinforcing the sense of belonging to a community (Fig. 67). Children also expressed the need to protect themselves and the community from "weird stuff online," with the inclusion of security features such as privacy policies and passwords (Fig. 68).

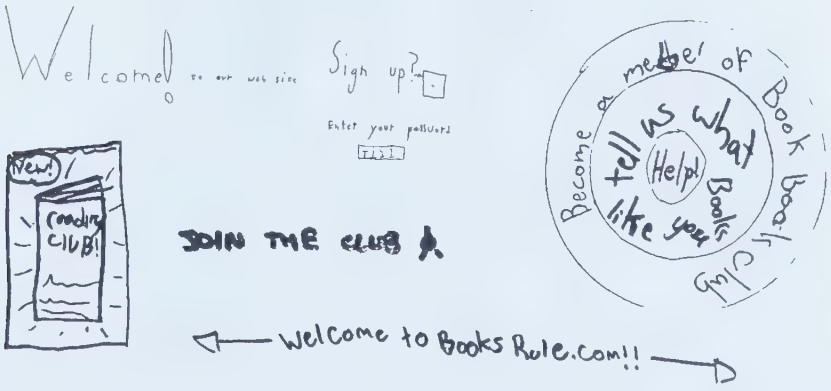


Fig. 67 Becoming part of *the club* appeared to be important for children.

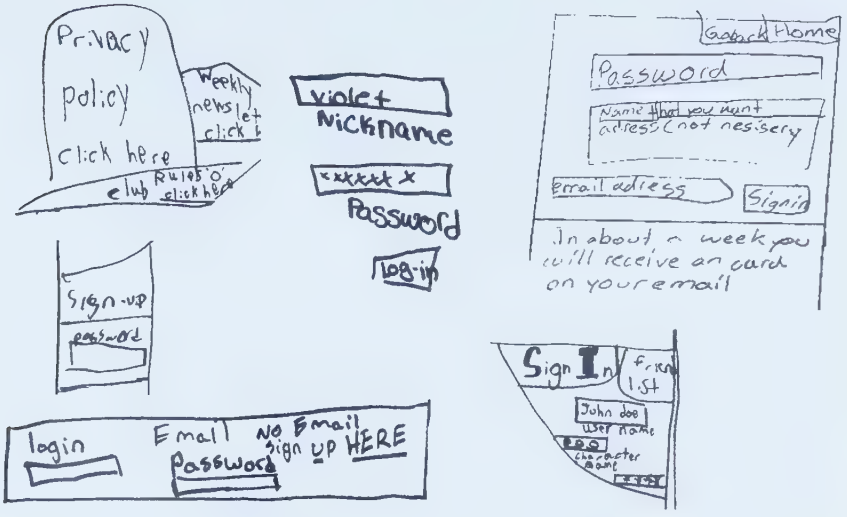


Fig. 68 Children showed awareness about how to protect their privacy.

- Rules of conduct and behaviour aroused naturally among children while chatting, which may indicate that the sense of belonging prompts them to protect and preserve the purpose of the community. "Marco, this is not a chat room. It is an online reading club," says *Matthew*, expressing his disapproval when *Marco* posted a message about hockey (Fig. 69).

Fig. 69 Rules of conduct and behaviour appeared during the discussion. In this case two children try to protect the purpose of the club [dialogue 4, group 4: text in next page].

MARCO	*new topic*	Topic: Colorado vs. St. Louis hockey series. Who do you think will win?
CHRIS	***disagree***	**Stay on topic.**
MARCO	*picture*	[a picture of a hockey game]
MATTHEW	***disagree***	**Marco, this is not a chat room. It is an online reading club.**
CHRIS	*agree*	Yeah, Marco, stay on topic.

DIALOGUE 4, GROUP 4

3. The visual tool motivated and inspired the active involvement and participation in discussion

Children showed excitement about posting comments. They were all eager to participate. They posted messages as quickly as possible. "I was surprised to find how enthusiastic kids were to participate in the silent discussion. They were eager to get up and post their comments," commented one research assistant. Children expressed their enjoyment of the activity saying that "it was fun communicating," and "it was fun to talk to other people online."

Although some children were concerned about communicating online with people they do not know, some others agreed that they would talk to children from other places. Their reasons were: "so I could meet more people;" "because I like learning about different cultures;" "because it would be fun to see what is like there;" and "it would be fun to learn how they live."

Collaboration

The analysis of children's participation during the discussion sessions, survey, drawings and research assistants' observations showed that the visual tool may succeed in engaging children in the shared construction of meaning. By helping children to visualize the products of collaboration, the visual tool (1) encourages cooperation, peer support and scaffolding of ideas; (2) enables the articulation of complex responses; and (3) encourages consciousness about the nature of those responses.

1. The visual tool encouraged collaboration, peer support and scaffolding of ideas

Children shared ideas with their peers on the board. They posted messages that expressed their thoughts, feelings and concerns. They added on each other's

comments either in writing or in drawing, which in turn, contributed to the building of a new meaning. They saw how their ideas grew on the board in the shape of branches of the network, helping them understand that if they work together "you can get things done faster and it is more fun" (Fig. 70).

Fig. 70 Children's shared ideas became visible in the shape of an organic network that grew with each contribution

Collaboration *Seeing the dialogues mapped on the board appears to help children to collaborate. It seems to become easier for them to add to other's comments when they see the threads on the board. Examples are presented.*

- Children collaborated with each other in the process of interpreting a topic or constructing a concept. In the following three examples, each child contributed a piece of information to the building of a more complete and complex idea (Figs. 71, 72, 73).

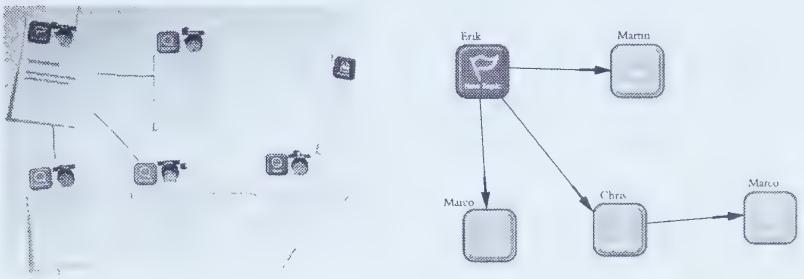


Fig. 71 The opportunities for action become clearer when mapped [dialogue 1, group 1: text below].

ERIK	*new topic*	What happens when we throw garbage in the environment?
MARCO	*speak up*	It poisons the plants and animals and kills them.
MARTIN	*speak up*	It pollutes animals and ecosystems.
CHRIS	*speak up*	It makes the place smell really bad and it isn't peaceful anymore. It's also bad for animals.
MARCO	*agree*	I agree because it sounds right and because you hear about pollution all the time.

DIALOGUE 1, GROUP 1

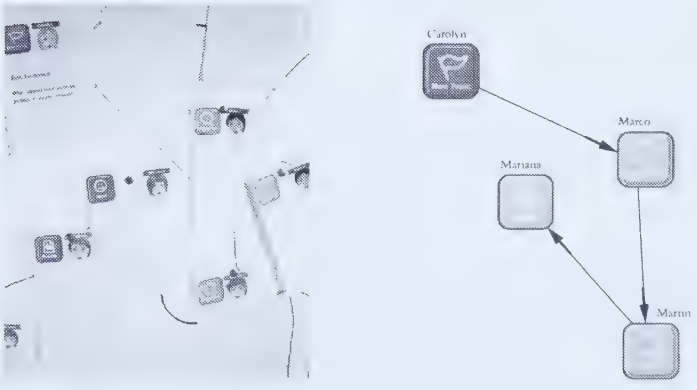


Fig. 72 Children collaborating to get a more complete idea [dialogue 4, group 3: text in next page].

CAROLYN	*new topic*	What happens when we throw garbage in the environment?
MARCO	*speak up*	It contaminates the environment around us.
MARTIN	*speak up*	Factories and machines, like cars, trains, jets and boats pollute the environment as well as garbage.
MARIANA	*agree*	And some make roads and wipe it completely!

DIALOGUE 4, GROUP 3

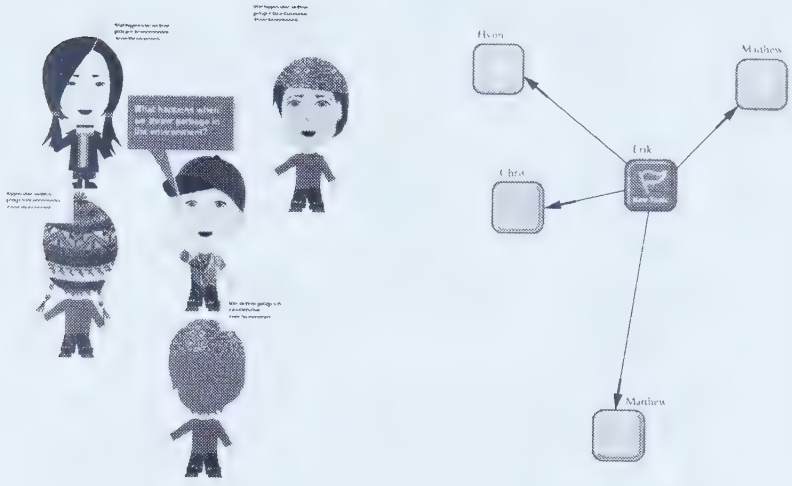


Fig. 73 The collaboration becomes more evident in the example above, where the child in the center appears to be receiving the contributions of the rest of the group [dialogue 5, group 4: text below].

ERIK	*new topic*	Angie says that two can do a lot more than one. What do you think? Do you agree?
MATTHEW	*agree*	I agree because when you work with company it's a lot more fun.
HYUN	*agree*	I agree that two can do a lot more than one because you can get things done faster and it is more fun working with someone else.
CHRIS	*speak up*	Because there are more peeps you get more ideas.
MATTHEW	*speak up*	People don't cooperate very well sometimes. But other times we cooperate because we need help.

DIALOGUE 5, GROUP 4

- The collaborative dialogues facilitated the finding of better solutions to problems. In the next example the whole group works together to find an alternative to the environmental problem (Fig. 74). Several ideas are exposed and the solution comes as a product of the dialogue:

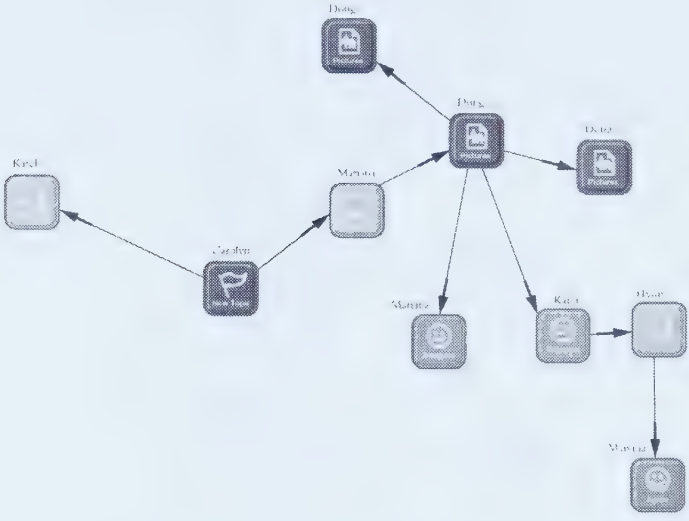


Fig. 74 The whole group working together in finding a solution to the environmental problem [dialogue 1, group 5: text below].

CAROLYN	*new topic*	What happens when we throw garbage in the environment?
KAREL	*speak up*	It pollutes things, and animals can die. In the story *Garbage Creek* salmon went away because of the pollution.
MARIANA	*speak up*	The environment, if you throw garbage in it, then it all eventually dies.
DONG	*picture*	[a person throwing garbage in a trash can] This is what we should do.
MARIANA	*disagree*	Yes, that is a good idea, but what happens when all that garbage piles up? It gets to be another environmental issue.
KAREL	*disagree*	Very true Dong, but what happens when the garbage cans overflow?
HYUN	***speak up***	**People should RECYCLE!**
MARIANA	*agree*	I agree!

DIALOGUE 1, GROUP 5

Peer support *Either by complimenting someone's drawing or by agreeing emphatically to someone else's ideas, the agree tool appears to be a good tool for encouraging children in providing support to their peers, inspiring them to participate. Examples follow.*

- The research assistant for group 1 observed: "...there was a girl that appeared shy. She did not post much. She was the first to draw a picture. The picture was complex. Marco commented positively about the drawing. It appeared as though he was offering support to the girl. By complimenting the drawing he encouraged her to participate" (Fig. 75).

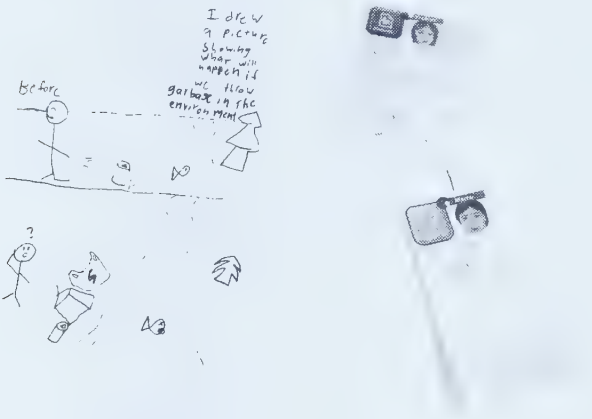


Fig. 75 *Marco* encourages *Frances* with a positive comment about her drawing [dialogue 2, group 1: text below].

FRANCES	*picture*	I drew a picture showing what will happen if we throw garbage in the environment.
MARCO	***speak up***	**I think your picture is very cool and realistic.**

DIALOGUE 2, GROUP 1

Scaffolding ideas *The* question *tool appears to help children in scaffolding their peers' ideas. By asking questions they motivate each other to provide support for their opinions. Ideas grow stronger as a consequence of the interaction. Examples are presented.*

- In the following example *Mariana* prompts *Matthew* to try to find a solution to the environmental problem he has just illustrated. What started with a pictorial

commentary on the environmental issue, ended with a more complex idea, and a possible solution to the problem (Fig. 76).

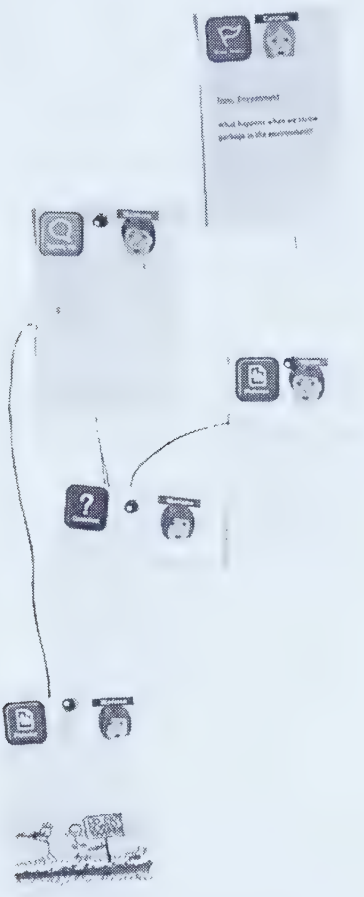


Fig. 76 *Mariana* asks a question that takes *Matthew's* idea further; then, she summarizes with a picture [dialogue 2, group 3: text below].

MATTHEW *picture*	[illustrates "Garbage Creek" polluted]
MARIANA ***speak up***	**How can we solve these problems?**
MATTHEW *speak up*	I think we could fix these problems by making signs and cleaning the creek at least once a week.
MARIANA *picture*	[interprets Matthew's idea graphically] Like this?

DIALOGUE 2, GROUP 3

The following is another case of a question that prompts a child to complete an idea. *Frances* asks a simple question that prompts *Dong* to complete his peer's idea:

ERIK	*new topic*	What happens when we throw garbage in the environment?
MARIA	*speak up*	We make it a dirty place to live and kills our water and fresh air.
FRANCES	***question***	**How does it?**
DONG	*speak up*	It pollutes the environment with gas and items that have been thrown in it.

DIALOGUE 2, GROUP 2

2. The visual tool enabled the articulation of complex responses

The possibility of visualizing their shared products or ideas created opportunities for action facilitating the linking of ideas, and the contributions and articulation of more complex responses. Children questioned, wondered, speculated, hypothesized and attempted to provide solutions to the problems they encountered.

- In the example below, *Martin* listened to what others had to say and summarized the idea at the end:

ERIK	*new topic*	What happens when we throw garbage in the environment?
FRANCES	*speak up*	It kills part of the environment.
DONG	*speak up*	I think it harms wild life and the environment
MARIA	*agree*	It must be!
MARTIN	*speak up*	**It pollutes the environment which can kill animals and make life hard for us.**

DIALOGUE 3, GROUP 2

Drawing to express complex ideas

The picture *tool appears to help children to express themselves, to produce more complex responses, to clarify ideas and to generate new ones. Examples are shown below.*

- Children commented that the picture tool was useful to "get ideas" and "to understand better." One child added that he liked this tool because "sometimes it is

easier to explain with drawings instead of words." The picture tool was also considered a collaboration tool, because "it was an easy way to link to others" (Fig. 77).

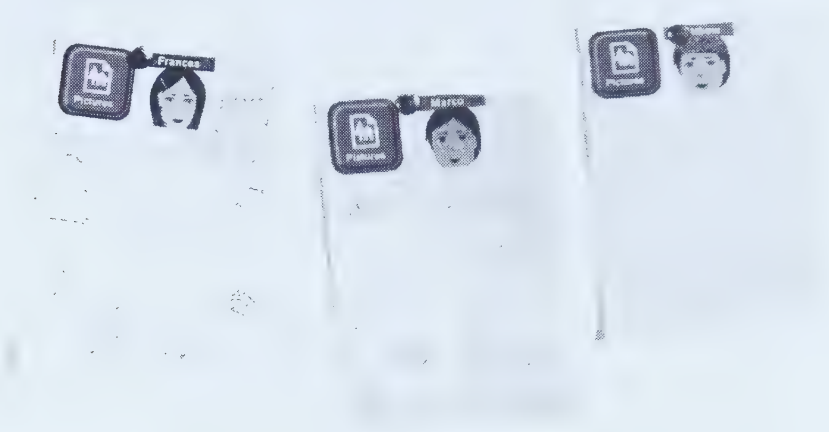


Fig. 77 Children draw to express complex ideas.

The research assistant for Group 3 said that, in general, children in that group used the picture tool "to elaborate on another's comment or to visualize what they wanted to say." In following example, *Matthew* posted a complex idea aided by the picture tool. After this, he posted a new message re-stating his idea but this time in a text-based format. It appears as if the picture had helped him to clarify his idea (Fig. 78).

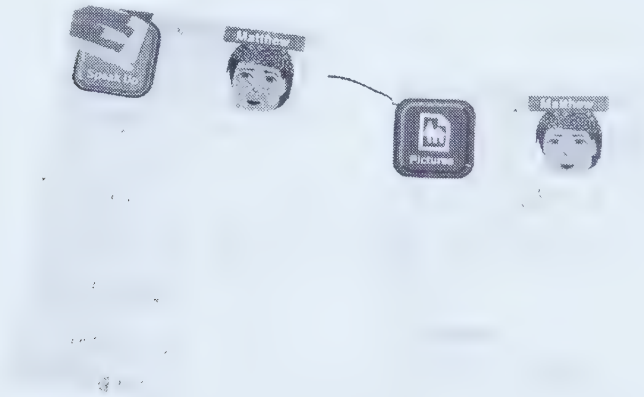


Fig. 78 *Matthew* posted a picture explaining a complex idea; after this, he posted a second message with the same idea, verbalized.

- The picture tool opened possibilities for participation within complex dialogues to children of different cognitive abilities. The two special needs students in the classroom used mainly drawings to contribute to the discussions (Fig. 79).

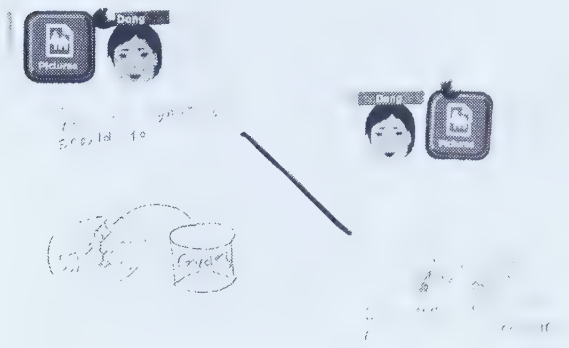


Fig. 79 "One child makes only drawings," observed a research assistant. *Dong* was one of the special needs students. He used the picture tool to successfully participate in the discussions.

3. The visual tool encouraged consciousness about the nature of responses

Whether it was a new topic, a question, an expression of agreement or disagreement, or a picture, children used the discussion tools to "express their feelings", as a child stated in the questionnaire. The use of these tools appeared to encourage children to think more carefully and to elaborate more critical and thoughtful responses.

Discussion tools *The discussion tools (new topic, speak up, agree, disagree, question and picture) are used as expected and they demonstrate how powerful they could be in facilitating the articulation of responses. Examples follow.*

New topic

Children comments about the *new topic* tool were very positive in general. They said that "it gives lots of things to do" and that "it is good to start new". They also expressed that the tool is useful because "it clearly states that the person

wants to talk about something else," and if they get bored of one topic, they can suggest a new one (Fig. 80).

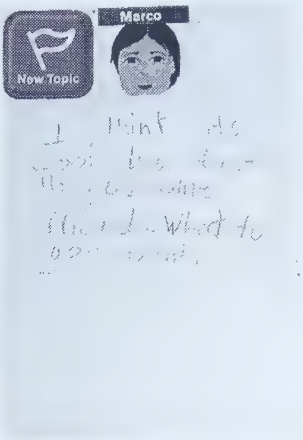


Fig. 80 Example of a new topic message.

MARCO *new topic* I think it's cool how fast they became friends. What do you think?

Speak up

The open character of the *speak up* tool appeared to enable children to talk freely and express a variety of opinions (Fig. 81).

Agree and disagree

These tools appeared to enable children to express different opinions in the context of a dialogue. Children's comments were highly positive about these tools: "I found this a good way to express my feelings;" and "[The agree/ disagree tool] made simple to say yes/no (and not too hard)". One child also commented on the instruction, saying that he considered "very helpful to explain why you agree or disagree" (Fig. 81).

Question

The question tool was used in various ways. As seen previously, it played an important role in prompting others to support their opinions. By asking questions, children helped each other in the generation of more complete and thoughtful ideas (Fig. 82).

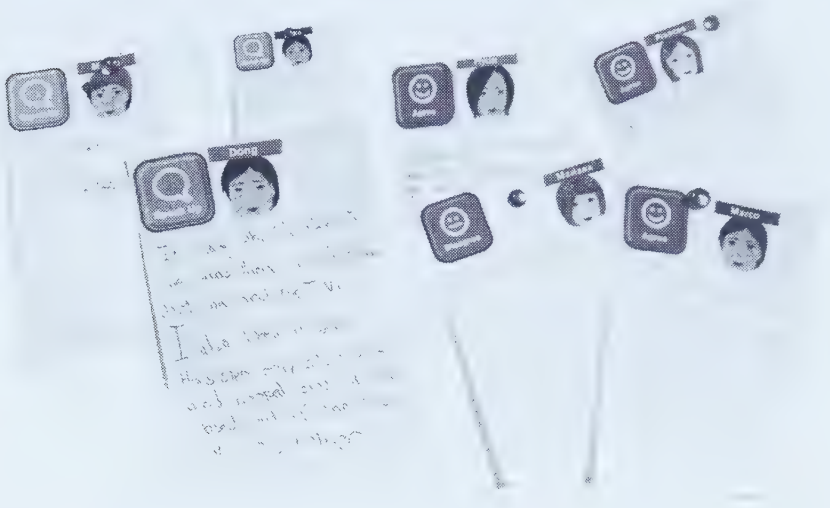


Fig. 81 Messages using *speak up* tool and *agree* and *disagree* tools.

Children also used the question tool to start conversations, to ask their peers for clarification, and to ask about things they do not know or understand (Figs. 82, 83). According to their comments, it was useful to see the question mark on the board, because "if you put that up somebody will know that you do not understand something". They also added that the question tool "helps to know what peeps are thinking", and helps them "get other's opinions".

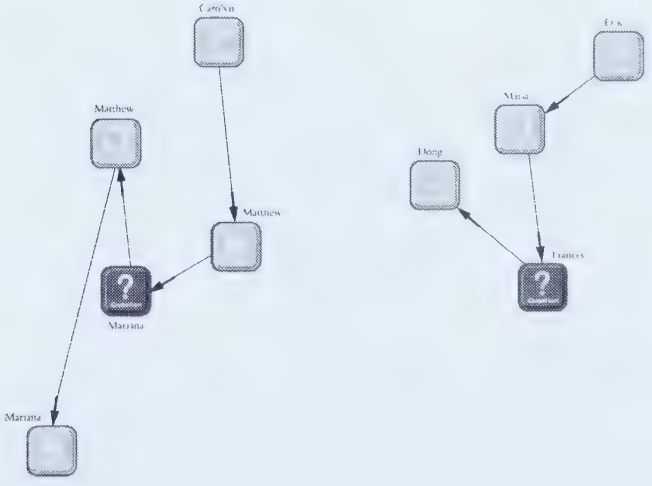


Fig. 82 Threads showing the visibility of the question mark on the discussion board.

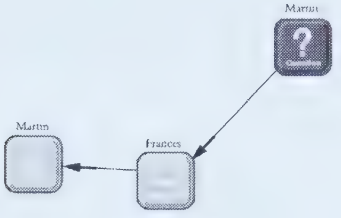


Fig. 83 Martin starts a conversation with a question [dialogue 6, group 1: text below].

MARTIN	***question***	**How long did it take them to clean up the stream?**
FRANCES	*speak up*	I think it was the whole summer.
MARTIN	*speak up*	Thanks, Frances.

DIALOGUE 6, GROUP 1

KAREL	***question***	**What is a salt chuck? Do you know?**
MARIANA	*speak up*	I think is a place with salt
HYUN	*speak up*	I think it is a kind of fish.
MARIANA	*disagree*	I don't think so because they were talking about arrowheads.

DIALOGUE 5, GROUP 5

MARIA	*new topic*	What's up with the whole dead fish?
MARTIN	*disagree*	I don't know.
MARIA	*speak up*	Don't you think they would have known if the fish were dead right away?
MARTIN	***question***	**What do you mean?**

DIALOGUE 4, GROUP 2

Visual quality of discussion tools

The discussion tools appeared to be easy to decode; a possible indication of this is that children used the tools as expected. When asked if the tools were easy to understand, the majority of children answered positively, adding that: "because they were brightly coloured they're easy to use;" "They are explained very well;" and "It says the name in the button." In addition, during the participatory

design session, several children recalled and re-used the discussion tools in their designs. The fact that they are able to remember them may indicate that the combination of icons and words works successfully (Fig. 84).

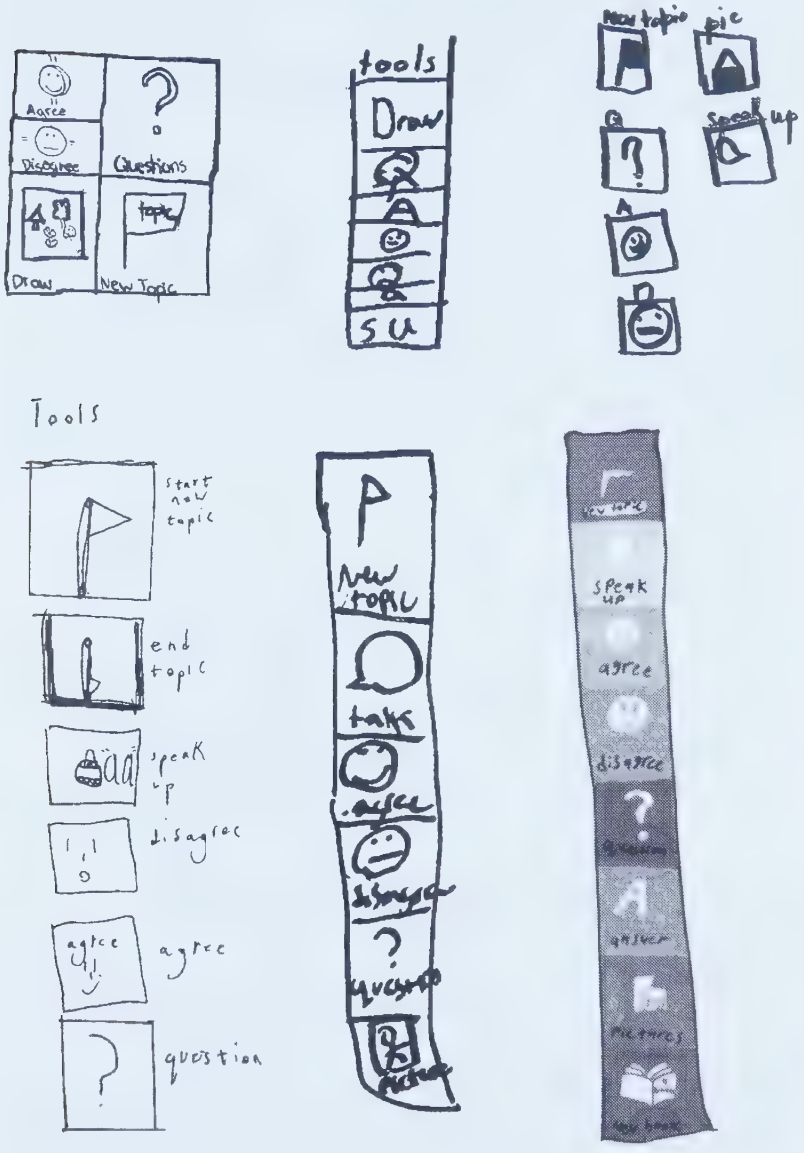


Fig. 84 Discussion tools in children's rapid low-tech prototypes.

Dialogue The analysis of children's dialogues during the discussion sessions, survey, drawings and research assistants' observations showed that the visual tool may succeed in enabling conversation, reflection and analysis. By helping children to visualize the paths of interaction and dialogue, the visual tool (1) fosters the development of communicational skills; (2) encourages the active listening of other's ideas, fostering appreciation of multiple interpretations; and (3) promotes reflection about their own and other's contributions.

1. **The visual tool fostered the development of communicational skills**

Children "talked" to each other on the discussion board. Without the aid of verbal cues, and through writing and posting messages, children engaged in enthusiastic conversations with peers. The tools on their messages acted as signals. As if a child were raising his hand, the *new topic* tool is saying, "Let's talk about this!" while the question mark is announcing, "I have this question, who wants to answer it?" (Fig. 85).

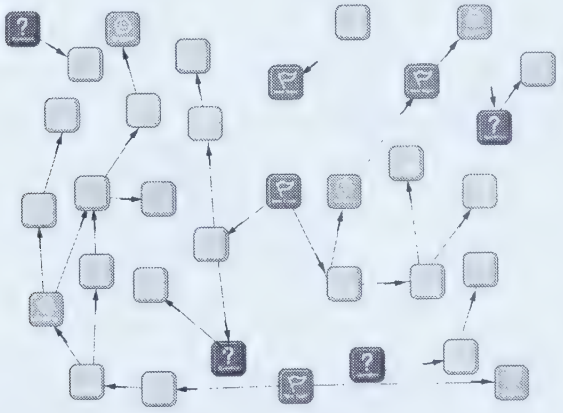


Fig. 85 Synthesis of a discussion to the discussion tools children used in their messages.

- The tools appeared to help children structure the dialogues, modeling the skills needed to get involved in group discussions: "I agree with you;" "I want to answer your question;" "I made this picture that illustrates what you say;" or "Let's change the topic." By using the tools, children may learn how to express agreement or disagreement with someone else's idea, how to ask for clarification or how to justify their opinions (Figs. 86, 87).

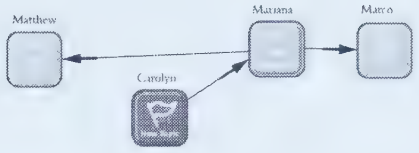


Fig. 86 Dialogue showing use of tools [dialogue 1, group 3: text below]

CAROLYN	***new topic***	What happens when we throw garbage in the environment?
MARIANA	***speak up***	It destroys animal, homes and destroys places that could be used for other things.
MARCO	***agree***	I agree with you because if the environment was clean, we could maybe swim in more lakes, or fish more.
MATTHEW	***agree***	I agree because pollution is a very bad thing and it kills living things.

DIALOGUE 1, GROUP 3

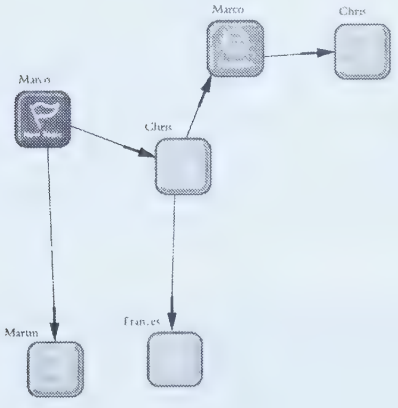


Fig. 87 Dialogue showing use of four tools [dialogue 4, group 1: text below]

MARCO	***new topic***	I think it's cool how fast they became friends. What do you think?
MARTIN	***speak up***	I thought it was great that they spent the whole summer at that creek.
CHRIS	***speak up***	I think that's sort of weird. I don't think anyone would become friends so fast.

FRANCES	***agree***	I agree, I thought it was very quick even if it was a short story.
MARCO	***disagree***	I disagree. I've got to be friends that quickly.
CHRIS	***speak up***	In one minute?

DIALOGUE 4, GROUP 1

- The *new topic* and the *question* tool helped children to start new conversations. If they do not feel like participating in any of the existing dialogues, children opened new opportunities.

KAREL	***new topic***	**What about those arrowheads that Angie was collecting?**
MARIANA	*speak up*	I liked that part of the book.
HYUN	*speak up*	I liked the part about the swans.

DIALOGUE 3, GROUP 5

DONG	***question***	**Where did the story take place?**
MARIA	*speak up*	In the creek.

DIALOGUE 7, GROUP 2

Connections *The lines connecting messages and participants appear to help them to see who is talking to whom and prompts them to answer. The lines also appear to remind them whom they are interacting with, helping to guide the dialogues. The possibility of seeing these connections makes the interactions grow stronger, engaging children in emphatic and enthusiastic dialogues.*

Fig. 88 Children connecting their messages with others.

Recording messages for later action

The diversity of threads might provoke that messages were overlooked—sometimes because of lack of ideas to contribute at the moment those messages are posted. By recording the messages, the network may be useful in creating opportunities for later action. Examples are presented.

- "For a long time no one answered *Martin's* question. When the discussion cooled down, *Marco* spotted the unanswered question and responded to it," commented the research assistant for Group 3, while another assistant observed that the two times he posted a message, children read it and did not answer until later. This suggests that what could be a lost opportunity for interaction in a face-to-face conversation, is recovered in the online discussion thanks to the recording feature of the network. In the following two examples, both *Matthew's* and *Karel's* messages remain on the discussion board, unanswered, waiting for someone to contribute to them (Figs. 89, 90).

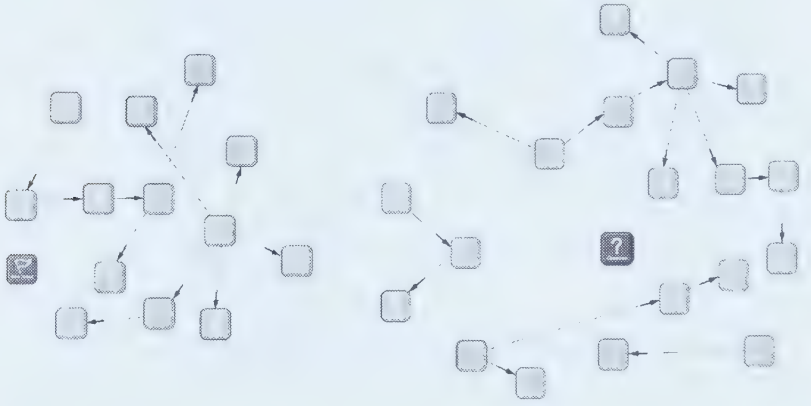


Fig. 89 (left) *Matthew's* new topic. Fig. 90 (right) *Karel's* question [groups 4 and 5: texts below)

MATTHEW ***new topic*** Topic: Reference. I would like to see more information and descriptions about salmon.
GROUP 4

KAREL ***question*** What does *midden* mean?
GROUP 5

2. The visual tool encouraged the active listening to other's ideas, fostering appreciation of multiple interpretations

Children did not take turns to talk within the silent discussions; therefore everybody had the possibility to participate simultaneously. A multiplicity of co-existing threads of dialogue offered a variety of opportunities for action: "I could answer *Carolyn*'s question, disagree with *Erik*, or make a drawing to clarify *Connie*'s idea," it could be an example of the possibilities a child may encounter when looking at the discussion board. Although children did not have to wait for their turn to *talk*, they had to *listen* to their peers in order to participate. Children paid attention to each other, reflected about other's contributions and structured their responses based accordingly.

Fig. 91 Multiplicity of co-existing threads of dialogue.

Learning form others *By seeing another's point of view in messages connected to their own, children may be encouraged to reflect and sometimes reconsider their opinions. Examples follow.*

- In the following two examples children changed their initial opinion after listening to a peer's comment. *Matthew* shares his idea with the group, "I think we should have more garbage cans and bigger fines." *Marco* contradicts him explaining why he thinks that is not a good idea. *Matthew* changed his mind, growing in his understanding of the issue (Fig. 92).

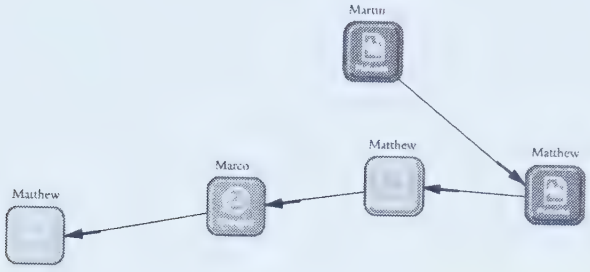


Fig. 92 After being contradicted, *Matthew* changes his mind [dialogue7, group 3: text below]

MARTIN	*picture*	[illustrates the contrast between a clean and a polluted environment]
MATTHEW	*picture*	[shows a $50.00 fine applied to someone that threw garbage in the environment; and a big garbage can]
MATTHEW	***speak up***	**I think we should have more garbage cans and bigger fines. Does anyone agree?**
MARCO	*disagree*	I disagree because if we don't fine them, what will stop them from doing it again? I think there should be something more than just a fine.
MATTHEW	***agree***	**I agree. There should be more than a fine.**

DIALOGUE 7, GROUP 3

Hyun starts with a negative comment about the story she read; after listening to *Mariana's* opinion, she agrees with her reconsidering her position.

HYUN	***speak up***	**I thought the story *Garbage Creek* was boring. It was too short!**
MARIANA	*speak up*	I agree with you that it was too short. But it was an interesting story.
HYUN	***agree***	**It was educational.**

DIALOGUE 2, GROUP 5

- When asked if the discussion helped them gain a deeper understanding of the story, children expressed interesting insights regarding the appreciation of

different opinions. "Yes, [the discussion helped me] because they looked at the story in a different way than me," commented one child. Aligned with this thought, another child expressed that the discussion was beneficial because when he/she read the story, he hadn't thought of some of the topics that came out during their conversations. "It was fun to see everybody's ideas;" "It was good to know people's opinions;" and "It told me other people's understandings" were some of children's responses.

3. The visual tool promoted reflection about their own and other's contributions

The dynamic of the discussion in the online environment appeared to make children more conscious about their responses. They had to consider a number of things before talking: Where can I contribute? Who am I going to talk to? What do I want to tell him? What type of message is the most appropriate for that response? As children did not have to talk in any specific moment, they had more time to elaborate their messages, resulting in more thoughtful responses.

- Children read what others have posted, reflect and add their contribution. This was seen in *Mariana's* contributions (Group 3). The research assistant for this group observed that, "*Mariana* was very careful with everything. It took her time to write and read other people's comments." In fact, she does not start the dialogues, but she contributes to them in a very thoughtful way. She questions her peer's comments and pushes the ideas further. In the following example, she is not happy about her peer's explanation and asks him a thoughtful question (Fig. 93).

MATTHEW	*question*	Why do people threw garbage into the creek?
MARCO	*speak up*	Because they thought if other people's garbage was there, it was ok to throw it in.
MARIANA	***disagree***	**How did the problem start then?**
MARCO	*speak up*	It started with one person throwing something in the creek in purpose or accidentally. Then somebody saw him do it and they thought it was ok. And so on and so forth.

DIALOGUE 3, GROUP 3

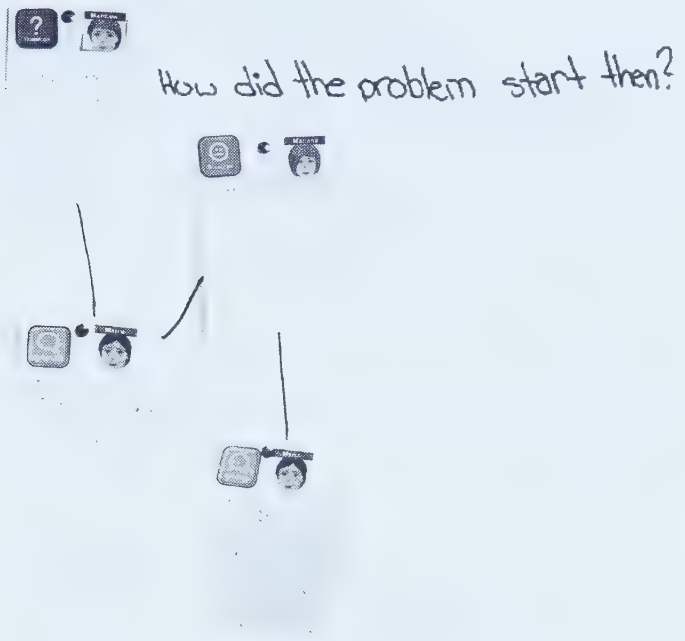


Fig. 93 *Mariana* is not satisfied with *Marco's* comment and asks a thoughtful question [dialogue 3, group 3: text in previous page].

Mariana also contributed to the completion and closing of an idea. She read her classmates' messages and gave her emphatic opinion summarizing what had been said (Fig. 94).

Fig. 94 *Mariana* summarizes emphatically his peers' comments [dialogue 6, group 3: text in following page]

MATTHEW	*speak up*	I think that people can be really [destructive] to the environment.
MARTIN	*agree*	I agree with protecting the environment because we would have cleaner lakes, rivers, oceans, cities, etc., and we might live longer.
MARIANA	*speak up*	**Not only in rivers do people pollute, but everywhere! Help out and put it in trash cans.**

DIALOGUE 6, GROUP 3

In the next example *Marco* demonstrates reflection about his classmate's picture. He disagrees with it and supports his statement even though another peer challenges him (Fig. 95).

Fig. 95 *Marco* reflects about Martin's drawing and supports his ideas [dialogue 5, group 3: text below].

MARTIN	*picture*	[illustrates a polluted environment] Title: No environment.
MARCO	*disagree*	I disagree with you because that picture is an environment, but not a very natural one.
MATTHEW	*disagree*	I think that that picture shows pollution.
MARCO	***speak up***	**Yes, the picture shows pollution but I was trying to say that I can't consider it a very good place to live, hence, a not good, polluted environment.**

DIALOGUE 5, GROUP 3

A space for individual reflection

If children do not find on the discussion board a dialogue that interests them, they still post individual comments. This may suggest that the discussion board can be used as a space for individual reflection as well. An example is presented.

- A research assistant observed that some children posted their comments without connecting them with others. A child's explanation for this was that he did not connect with others because their comments did not fit with any other dialogue on the board. There is also an interesting example in Group 4, where a child appears to have a conversation with himself. This child did not find much collaboration in his group, however he posted messages and reflected about issues (Fig. 96).

Fig. 96 Although *Matthew* appears to have a conversation with himself, he is reflecting on issues that interest him [dialogue 3, group 4: text below]

MATTHEW	*new topic*	Story structure and the mechanics. How did you think the story structure was?
HYUN	*agree*	I think the story structure was a good story structure.
MATTHEW	*disagree*	I disagree because I think they became friends too quickly.
MATTHEW	*speak up*	I don't quite think that the story mechanics were all that strong. I've definitely seen better story lines.

DIALOGUE 3, GROUP 4

Other features

Discussion toolkit design

Children expressed unanimously that the discussion toolkit was easy to use. "The discussion toolkit was easy to use because it was simple and broad;" "It was right there and bright;" "It was all set up already;" "Simple;" "Straightforward;" "Very organized;" "Very well explained;" "Easy to understand;" "All designed;" "It was right there at your finger tips." These comments reinforce the idea of providing children with a simple, visually clean and informative piece, where all the elements are well explained and there are no doubts about the functioning and procedures to follow.

Help function

Children's drawings showed awareness of *help* tools in websites. Almost all children included a *help* button in their designs; one child even added the following text to her *help* function: "Have a problem with our site? Click here to list your complaint. Warning: we may not read it," what could show possible frustration regarding sites that do not work properly and do not offer good solutions to problems they encounter (Fig. 97)

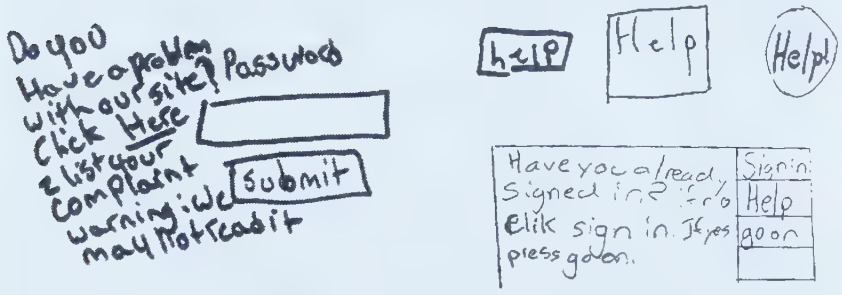


Fig. 97 Help functions within children's websites.

Class presentation

The discussion board has the advantage of recording the discussions, collecting information such as children's contributions, threads of dialogues and number of topics. This feature could be used for class presentations. This was observed during the group presentations, when children showed to the rest of the class what had happened in their groups. Children used the discussion boards as a helper in recalling the paths of their interactions. The resulting artifacts proved to be very useful in giving children material to talk about, such as commenting

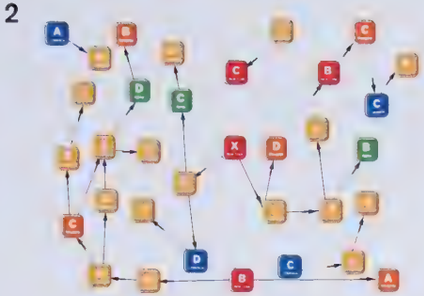
about a climax in the discussion, which were the topics that they got more interested in, or how they had to tell someone to go back on topic (Fig. 98).

- A written report could also be obtained after discussion, with a transcription of the dialogues, the collection of drawings, topics, etc. The possibility of seeing their conversations in a dialogue format could be used for analysis and reflection.
- The recording feature could also provide teachers with a tool for performance assessment, with no need to be present during the discussions. It could make possible actions such as analysis of individual and group performance, analysis of the quality of responses and interaction, and analysis of use of communication skills (Figs. 99, 100, in *foldout*).

Fig. 98 Children used the discussion boards to talk about their group experience within the silent discussions.

1

2



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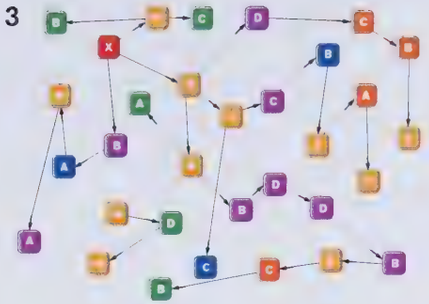

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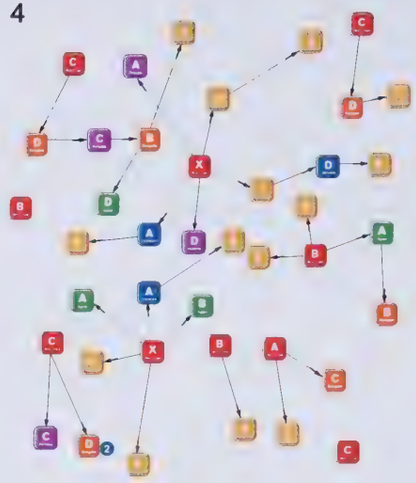

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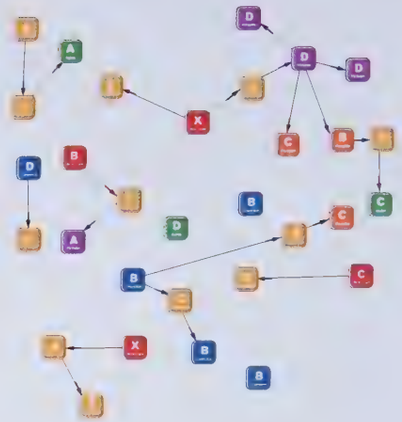
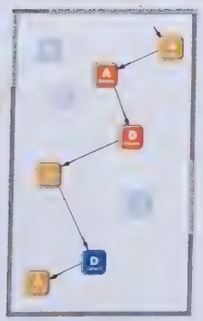


Fig. 99 (above) Diagrams that result from the synthesis of the discussions to show only flow and thread of dialogues within the five groups involved in the testing.

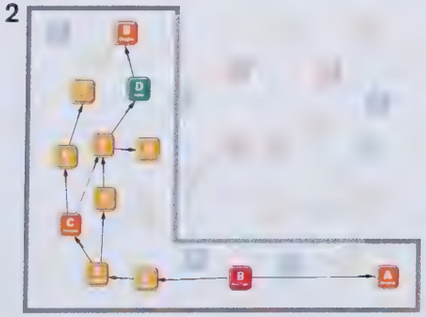
Fig. 100 (below) Teachers could use these diagrams to analyze groups and individual performance. The comments added to the diagrams are an example of what these diagrams could reveal.

1



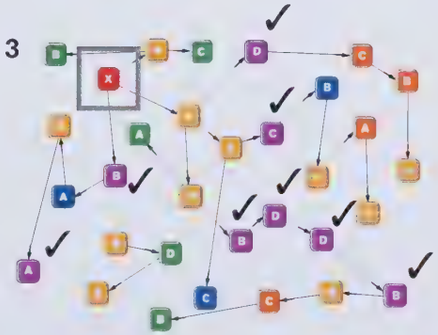
- *intriguing interaction between two children*
- *starts with a common disagreement*
- *what does the zigzag mean?*

2



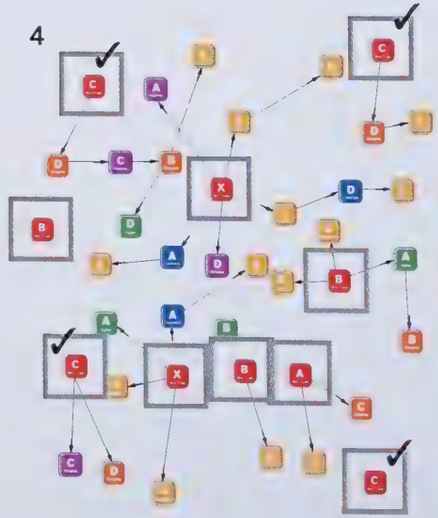
- *all children participating in a long thread build mainly with the Speak Up tool. What are they talking about?*

3



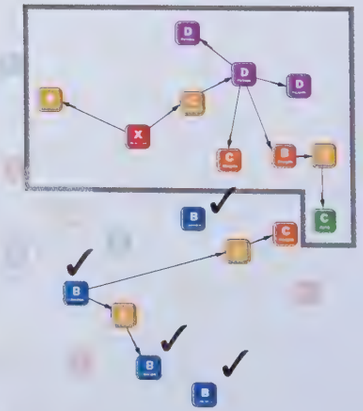
- *one New Topic appears to originate all the discussions*
- *profuse use of the picture tool*

4



- *several New topics*
- *short interactions: are they building dialogues?*
- *student C tries to start conversations*

5



- *long thread: student D makes drawings; student C and B disagree with him; conversation appears to end with C agreeing. What are they talking about?*
- *student B asks questions; what are these questions about?*

Unexpected outcomes

Limitations, considerations and opportunities

Unexpected outcomes are discussed in this section, which may lead to the finding of limitations and opportunities in relation to the visual tool proposed. Actions to be taken in relation to further research are explained in each case.

Expert users

The children that participated in this project proved to be expert users of computers and the Internet. Their designs show a strong influence of existing communicational systems in online media. They are familiar with branding and naming of these websites, including URL addresses. They understand the concept of multiple pages and tabs within an interface, use of buttons and chat systems. They appear to be very well-adapted to using instant messaging systems as a form of communication. This opens a question regarding the performance of this prototype with novice users. Further research should be done including children less skilled in the use of computers and the Internet.

Security issues

Although concerns related to security issues in the online media were expected, some children expressed in the questionnaires that they would not participate in open clubs online. "The weird things and viruses on the Internet don't exactly make me feel secure. I'd participate in class," commented a child. The initial idea of an open, multi-cultural reading club online appears to be not appropriate. Private discussion groups belonging to a school or community, and registration made by a teacher or parent could be among the options to ensure privacy. It is recommended to explore the issue of privacy and security policies further.

Discussion tools

Even though the discussion tools work as expected in general terms, some unexpected issues appeared in connection with the *disagree* and the *question* tool. Children also requested the addition of more tools.

In the case of the *disagree* tool, although its was used mainly to disagree with someone else's opinion, it was also used to disapprove of behaviour, to express discomfort and upset. Although in all the cases the unhappy face of the *disagree* tool functions well, it raises a concern regarding the need for differentiation between feelings: How important is it to show a difference between 'I disagree', 'I disapprove' and 'I am upset', within a discussion?

Concerning the *question* tool, only one of the five groups made a difference between 'task' and 'non-task' questions. General questions within a dialogue, such as asking for clarification, were mostly asked using the *speak up* tool, while questions about the story itself were asked using the *question* tool. Although this is not considered an incorrect use of the tool, it brings up an interesting question that would require further research: Should the *speak up* mode be the default for all the messages and only when they need to *signal* or attract attention they use one of the special tools?

Regarding the addition of tools, children requested an *answer* tool and an *end topic* tool. It is interesting that they ask for the two tools that have a counterpart: a question needs an answer, and a new topic needs to end at some point. As these tools were not considered in this study, exploration should be done regarding the addition of an *answer* tool:

- Would an *answer* tool restrict the function of the *question* tool?
- Could this lead to quizzing activities, and a series of question-answer interactions?
- Would this be negative?

and an *end topic* tool:

- Is it important to end topics?
- Could the ending of topics be complemented by a summary?
- Who is entitled to end a topic and how would this work?

Instruction

Although the purpose of the study was to assess the effectiveness of the visual tool in facilitating discussions about literature, in several cases children did not talk specifically about the story they read for the activity. When asked if the discussion had helped them to gain a deeper understanding of the story, some children answered that they had not talked much about the story, because they had talked about the environment.

A mistake in the planning of the instruction could have been the cause of this, for the first topic posted by the research assistants to start discussions was precisely a topic about environmental issues. What was not foreseen was that children would not relate this topic with the story and engaged in enthusiastic dialogues about pollution and protection of the environment as broader concepts. Nevertheless, good discussions were shaped around these topics, and the im-

portant aspects that were being observed in the testing—the visual tool facilitating interaction, collaboration and dialogue—were successfully achieved.

For future testing it is highly recommended to plan the activity having in mind that unless the messages to stimulate discussion are strictly based on the text, children, without the guidance of the teacher, might not be able to relate broad concepts to specifics in the reading. This also raises questions about the need for a teacher to monitor the discussions:

- Is there a need for a moderator? How much control should this moderator have? Should she get involved in the discussions? In what other ways could the moderator participate?

Off-topic dialogue Although in general the groups talked about the story and the topics proposed, some cases of dialogues going off-topic appeared. The novelty and game-like nature of the activity, the chosen story—some children considered it boring—or the pre-conceived ideas about online communication could be among the variables that may have caused this problem.

In the case of Group 2, the off-topic issue achieved considerable proportions (Fig. 101), but in spite of not achieving many meaningful ideas in their dialogues, these children showed excitement about using the tools to communicate with others. When asked why they thought they had gone off-topic, a girl answered: "Because we wanted to joke around... we just wanted to talk."

Fig. 101 By the end of the discussion, Group 2 goes completely off topic. One of the participants, *Martin*, tries to get his group back on topic, with little success [dialogue 9, group 2: text in next page].

MARTIN	*new topic*	Back to the environment!
FRANCES	*disagree*	No way!!!!!
MARIA	*speak up*	OK, so put us back on topic.
MARTIN	*new topic*	The new topic is Water life.
MARIA	*speak up*	No!!!!
MARTIN	*picture*	[illustrates fishes] But it will be fun!

DIALOGUE 9, GROUP 2

Since this group is the one that shows the largest number of postings, and the observations of the research assistant for this group regarding the speed of postings emulating a quasi-online conversation, and their high adaptability to this form of communication, it raises the following questions:

- Do children in this group have pre-conceived notions of how to talk in an online environment?
- Are they used to the computer as a tool to just have fun and fast conversations?
- How can this personal talk and play be controlled in a way that permits a more meaningful dialogue about the reading without restricting them too much?
- Could the presence of a moderator help keep children on track and on topic?
- If the teacher periodically monitors the discussions, would that be enough to prevent misbehaviour or unfocused dialogue? Knowing they are being observed would make children act more responsibly?

In relation to the off-topic issue, further research should be done about:

- the role of a teacher in monitoring discussions;
- implementation of clearer instruction with more definite tasks to accomplish, such as discussing specific topics or presentation to the class of the ideas developed; and
- discussions that last more extended periods of time, where it could be easier to identify how much personal conversations or off topic dialogues occur, and if this hampers the overall instruction.

Implications for design

RECOMMENDATIONS

For the purpose of developing an environment where social interaction is facilitated, where conversation, reflection and analysis are enabled, and where children feel motivated to engage in the shared construction of thoughtful and complex responses about literature, it is important to:

- help children to perceive the live presence of others, as well as their own presence in a common space they feel they belong to, which is secure and safe;
- facilitate the visualization of the complexity of a multiplicity of dialogues happening in simultaneity;
- help children in identifying the opportunities for interaction;
- provide children with tools to structure their messages, offering them a variety of clear possibilities for action;
- facilitate collaboration, peer support and listening to other's ideas; and
- provide children with a tangible result of their conversations for its use in class presentation.

The following are recommendations for the future design of a reading club online based on the premises stated above.

Individual and group identity, policies and rules

- *Identity.* The name of the website should be inviting and speak to them in their language: "ReadingRocks," "BooksRule!" "BookWorm" and "FunRead" are among children's suggestions.

- *Security policies.* It is very important for children to preserve their individual and group privacy. Security policies, sign-in procedures, membership and identification of groups belonging to different classes or schools are among the possibilities to, not only prevent undesired visitors, but also help in the building of the community.

- *Rules.* The need for clear rules about how to behave within the club is critical for children, who suggested introducing a system of voting to disconnect a person who is misbehaving. Given that children showed the ability to *police* each other

in order to maintain the group on topic, this could be a feature to consider. However, further research should be done in order to confirm that children could responsibly use a tool of these characteristics.

- *Characters.* Regarding self-representation, customization of characters appears to be an asset. The creation of a cartoon-like character of themselves amused children. The features to consider for the design of the characters are those that introduce differences among them and accentuate their identities or personalities, such as hairstyle, clothing and accessories.

  Given the enthusiasm children showed in relation to the characters and their clothing, it is recommended to include instances in which the full body is shown; a participants' profile that introduces them to the rest of the group could be an example. The use of full body characters in the discussion space could also be beneficial in transmitting a sense of realism and presence, emulating a face-to-face encounter. This should receive further investigation for the risk of making the discussion board too complex could divert from the main goals.

Discussion space, tools and connections

- The use of a discussion space, where children can see the others participating, the connections among them and the dialogues in constant growth, is important in order to achieve a sense of live presence.

- The possibility of seeing the dialogues and threads mapped on the discussion space is vital to help children to collaborate and engage in dialogues, for it enables the identification of opportunities for interaction, as well as the linking to other's messages. It is also important to clearly show the type of messages others are posting so as to help children in planning and structuring their responses.

- Easy and intuitive ways of relating to others within the discussion space should be established, such as *clicking* the person they want to talk to, or placing the message next to that person and drawing a line.

- Features that relate specifically to the activity on the discussion space should be considered in order to help children in the location of topics, threads, and

questions to answer, etc. Also, these informative features could help them in their reflection on how the discussion is being shaped. Some examples of this are:

- history of postings;
- information about threads that are having activity;
- updated information about topics within a discussion, number of pictures, agreements and disagreements, questions;
- most popular threads; topics that generated the biggest number of agreements or disagreements; and
- participants that posted the biggest amount of postings or participants that does not show activity.

Discussion tools

- The use of discussion tools help children to participate in the dialogues. It is important that these tools provide clear possibilities for action. It is essential to include clear information on how to use these tools, so as to foster their use.

- The use of these tools model for them the communicational skills needed to participate in rich discussions, and act as signals on the discussion board: "I propose a new topic," "I want to say something" "I agree with you," "I disagree with you," "I have a question," "I made a picture." According to their performance during the testing, the discussion tools are useful to:
  - (new topic) signal the beginning of new threads, as well as open the possibilities to explore different issues;
  - (speak up) provide a space for free speech, which could also be used to make questions or express agreement;
  - (agree) facilitate opportunities for peer support and encouragement;
  - (question) facilitate the scaffolding of ideas; provide opportunities to ask for other's opinions, clarification, meaning of words, etc.
  - (disagree) help children in expressing different points of view, as well as challenging and prompting others to give support for their opinions;
  - (pictures) work as an invaluable tool regarding the articulation of complex responses, organization of ideas and linking to others, as well as facilitating the participation of children of different cognitive levels. Additional features such as the possibility of attaching photographs, maps or scanned images could improve the utility of this tool.

- Regarding the graphic quality of the discussion tools, it is recommended to use a combination of simple icons—grounded on well-known objects—and words. A well-defined colour-coding with clear tonal differentiation is recommended to aid recognition of the tools on the discussion board.

Immediacy and update

- Visual cues that confirm the live presence of others and themselves help children in achieving a sense of realism in the online media. Examples of these could be:
    - the space reacts to their presence when they sign-in: it welcomes them, it provides information about other users online and how many discussion spaces are available;
    - a button lights up when a discussion is in progress;
    - a sign indicates when a user gets online;
    - the user that is talking is highlighted; and
    - a sign blinks informing the user that someone has answered her question.

Additional features

- *Overall design.* The design of the interface and its elements (instructions, tools, procedures, etc.) must be simple, informative and clear. It must include straightforward *help* functions throughout the website, to assist children with the problems they may encounter.

- *Visual tool for presentation.* The website must be able to record the discussions, and provide a tangible artifact resulting from them, such as a hard copy or digital file of the discussion space. This would provide children with an instrument or visual tool for class presentations.

- *Written report.* It would be useful to provide students and teachers with a report containing all the dialogues, identification of threads, collection of drawings, etc., that could aid in the reflection and analysis of the work done—and in the case of teachers, as a performance assessment tool.

Conclusion

Learning how to enjoy reading and developing critical thinking and communicational skills are essential for children's development and future success. Motivating children to read becomes a challenge in a reality in which computers engage the young audience with interactive experiences. Visual communication designers, working in collaboration with teachers, children and psychologists, can contribute to the teaching of literature and reading in elementary school, developing interactive learning spaces that are consistent with children's interests. The implementation of methods from the social sciences in combination with user-centered approaches, such as participatory design and observation of children interacting with materials, can aid the process of design towards the development of flexible and appropriate learning environments that motivate and challenge children.

In this thesis project, issues were explored regarding the creation of an online reading club for children, where visual tools are aimed to facilitate the virtual experience of interacting with others. The sharing of interpretations through on-line dialogues with peers could attract children to reading activities in an active, playful and collaborative way, introducing literature as a tool for communication with others and fostering the habit of reading. The online reading club could connect students, schools and communities worldwide, enabling children to participate in dialogues about literature from remote places. It could also benefit the teaching of literature through *e-learning*, by promoting the development of joint school projects that could build geographic and cross-cultural bridges.

A paper prototype, which simulated an online reading club discussion, was developed. It consisted of visual tools to facilitate the creation of messages, the building of dialogues, collaboration among children and the sense of presence in the online medium. Contextual observation and participatory design methods were implemented for the evaluation of the prototype, in testing that involved twenty-three children in grades five and six.

Children's needs regarding tools to aid discussion, discussion dynamics, quality of responses and motivational aspects were analyzed in order to establish implications for the future design of the website for an online reading club.

The analysis of the data collected suggested that the use of the visual tools proposed could support discussions in online reading clubs by facilitating interaction, collaboration and dialogue. The artifacts resulting from the visual discussions could be used by children in the analysis and reflection of group discussions, and as an aid for class presentations. The visual tools showed potential for use by teachers as a tool for performance assessment.

The effectiveness of the silent discussion mediated by the paper prototype suggested that this activity and related materials could be used in the classroom as an activity in itself, to: introduce children to discussion dynamics procedures; to enable the participation in discussions of children of different cognitive abilities; to stimulate responses as an alternative to the verbal discussion within face-to-face reading clubs; and to train children in the dynamics of communication mediated by computers.

Some limitations in the study would require further research, such as the inclusion of children less skilled in the use of computers, privacy and security policies in online children's communities to ensure a safe space for interaction, and the implementation of a discussion moderator.

Based on the performance of the prototype, children's comments and artifacts made during the participatory design sessions, recommendations for the design of an online reading club were stated. Some of the premises are: to help children to perceive the live presence of others, as well as their own presence in a common space they feel they belong to, and which is secure and safe; to facilitate collaboration, peer support and listening to other's ideas; to facilitate the visualization of the complexity of a multiplicity of dialogues happening in simultaneity; to help children in identifying the opportunities for interaction; and to provide children with a tangible result of their conversations for its use in reflection, analysis and class presentation.

It is hoped that this preliminary work can contribute to dialogues between disciplines towards the development of joint projects aimed at exploring ways of engaging children to read in active and pleasurable ways.

References

Alberta Education (1998). *Information and Communication Technology (K-12) Curriculum.* Alberta, Canada

Alberta Learning (2000). *English Language Arts (K-9) Curriculum.* Alberta, Canada.

Alberta Learning (2000-03). *Information and Communication Technology (K-12) Curriculum.* Alberta, Canada.

Arizpe, E. & Styles M. (2003). *Children reading pictures: Interpreting visual texts.* London: Routledge Falmer.

Bainbridge, J. & Pantaleo, S. (1999). *Learning with literature in the Canadian elementary classroom.* Edmonton, AB: University of Alberta Press.

Bainbridge, J., Coleman, W. & Gellner, J. (2004). Assessing children's growth in literature circles and discussion groups. READ: Reading, Exploration and Discovery. *The Journal of the Louisiana Reading Association* 25(1), *in press.*

Bertin, J. (1983). *Semiology of graphics: Diagrams, networks, maps.* Madison: University of Wisconsin Press.

Bettelheim, B. & Zelan, K. (1981). *On learning to read: The child's fascination with meaning.* New York: Knopf.

Biuk-Aghai, R.P. (2001). Visualizing structural and behavioural aspects of virtual collaboration. *Tenth IEEE International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises. Proceedings.* Cambridge, MA.

Blair, H. & Sanford, K. (2003, February 21). *Boys demonstrate literacy in ways the current curriculum doesn't assess.* Message posted to Australia's e-journal of social and political debate: http://www.onlineopinion.com.au/view.asp?article=962

Borges Gouveia, L. & Borges Gouveia, J. (2002). A proposal for using visualization to support collaborative learning. *E-Learn 2002 World Conference on E-learning in Corporate, Government, and Healthcare & Higher Education. Proceedings.* Montreal, Canada.

Brisbourne, M., Pacher, C., Radzikowska, M. and Robertson, B. (2003). [Design Space project]. *Unpublished.* University of Alberta.

Bromley, K.D.A. (1991). *Webbing with literature: Creating story maps with children's books.* Massachusetts: Allyn & Bacon.

Chuah, M.C. & Roth, S.F. (2003). Visualizing common ground. *Seventh International Conference on Information Visualization. Proceedings.* London, England.

Collins Tidwell, L. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research* 28(3), 317-348.

Daniels, H. (1994). *Literature circles: Voice and choice in the student-centred classroom.* York, ME: Stenhouse Publishers.

Daniels, H. (2002). *Literature circles: Voice and choice in book clubs & reading groups.* Portland, ME: Stenhouse Publishers.

Danko-McGhee, K. (2000). *The aesthetic preferences of young children.* Lewiston, NY: E. Mellen Press.

Dawson, D. & Fitzgerald, L. (1999). *Literature circles: Reading in action.* Wagga Wagga, NSW: Centre for Information Studies, CSU.

Druin, A. & Solomon, C. (1996). *Designing multimedia environments for children: Computers, creativity and kids.* New York: John Wiley & Sons.

Dugan, J. (1997). Transactional literature discussions: Engaging students in the appreciation and understanding of literature. *Reading Teacher* 51(2).

Fox, M. & Wilkinson, L. (1997). No longer travelers in a strange country. *Journal of Children's Literature* 23(1), 6-15

Frascara, J. (1997). *User-centred graphic design. Mass communications and social change.* London: Taylor & Francis.

Frascara, J. (2001). Diagramming as a way of thinking ecologically. *Visible Language* 35(2), 164-177.

Frascara, J. (Ed.) (2002). *Design and the social sciences: Making connections.* London: Taylor & Francis.

Gross, B. (2001). Instructional design for computer-supported collaborative learning in primary and secondary school. *Computers in Human Behavior* (17), 439-451.

Hansen, T., Dirckinck-Holmfeld, L., Lewis, R. & Rugelj, J. (1999). Using telematics for collaborative knowledge construction. *Collaborative learning: Cognitive and computational approaches.* (P. Dillenbourg, Ed.). Oxford: Pergamon-Elsevier Science.

Heeter, C. (1992). Being there: The subjective experience of presence. *Presence: Teleoperators and Virtual Environments*, MIT Press (Fall).

Heller, S. (Ed.) (2001). *Education of an E-designer.* New York: Allworth Press.

Hubbard, R. (1989). *Authors of pictures, draughtsmen of words.* Portsmouth: Heinemman Educational Books.

Hyerle, D. (1996). *Visual tools for constructing knowledge.* Alexandria, VA: Association for Supervision and Curriculum Development.

Jewell, T.A. & Pratt, D. (1999). Literature discussions in the primary grades: children's thoughtful discourse about books and what teachers can do to make it happen. *Reading Teacher* 52(8).

Johnson, D.W., Johnson, R.T., & Johnson Holubec, E. (1988). *Advanced cooperative learning.* Edina, MN: Interaction Book Company.

Kail, R.V. (1998). *Children and their development.* New Jersey: Prentice-Hall.

Kreijns, K., Kirschner, P.A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior* 19(3), 335–353.

Ladan, C.J. and Frascara, J. (1979). Three variables influencing the picture preferences of South and North American boys and girls. *Icographic* (13), 2–5.

Lowyck, J. & Pöysä, J. (2001). Design of collaborative learning environments. *Computers in Human Behavior* (17), 507-516.

McCoy, K. (2001). Recent directions in graphic design education. *Education of an e-designer.* (S. Heller, Ed.). New York: Allworth Press.

McMahon, S.I. & Raphael, T.E. (Eds.) (1997). *The book club connection: Literacy learning and classroom talk.* New York: Teachers College, Columbia University.

Mealing, S. (2000). Do you see what I'm saying? *Iconic communication.* (M. Yazdani & P. Barker, Eds.). Bristol: Intellect Books.

Moline, S. (1995). *I see what you mean.* York, ME: Stenhouse Publishers.

Möller, K.J. (2002). Support for dialogue. *Language Arts* 79(6).

Olson, J.L. (1992). *Envisioning writing: Toward an integration of drawing and writing.* Portsmouth: Heinemann Educational Books.

Peterson, R. & Eeds, M. (1990). *Grand conversations. Literature groups in action.* Richmond Hill, Ontario: Scholastic.

Plowman, L. (1996). Designing interactive media for schools. *Information Design Journal* 8(3), 258-266.

Poole, B.J. (1997). *Education for an information age: Teaching in the computerized classroom.* Boston, MA: WCB/McGraw-Hill.

Raphael, T.E. & Boyd, F.B. (1997). When readers write: The book club writing component. *The book club connection: Literacy learning and classroom talk.* (McMahon, S.I. & Raphael, T.E., Eds.). New York: Teachers College, Columbia University.

Rosenblatt, L.M. (1982). The literary transaction: Evocation and response. *Theory into Practice* 21(4), 268-277.

Sadler Takach, B. & Varnhagen, C. (2002). Partnering with children to develop an interactive encyclopedia. *Interaction design and children.* Eindhoven, The Netherlands: Shaker Publishing.

Sanders, E.B.-N. (2002). From user-centered to participatory design approaches. *Design and the social sciences: Making connections.* (Frascara, J., Ed.), London: Taylor & Francis.

Shaffer, D.R. (1999). *Developmental psychology: Childhood and adolescence*, Pacific Grove, CA: Brooks/Cole.

Sharing Literature Group E-mail messages retrieved from sharelit@yahoogroups.com, February-June, 2004.

Snyder, C. (2003). *Paper prototyping: The fast and easy way to define and refine user interfaces.* San Francisco, CA: Morgan Kaufmann.

Spiegel, D.L. (1998). Reader response approaches and the growth of readers. *Language Arts* 76(1), 41-48.

Sumara, D., Davis, B. & Van Der Wey, D. (1998). The pleasure of thinking. *Language Arts* 76(2), 135-143.

Appendix

A Material consulted

Children's websites

B Ethics application

Application

Proposal

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C Testing materials

Discussion toolkit

Short story

Questionnaire

D Data collected

Rapid low-tech prototypes

Questionnaire responses

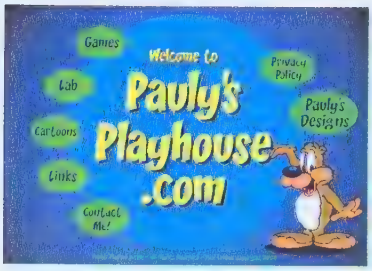
Discussion boards

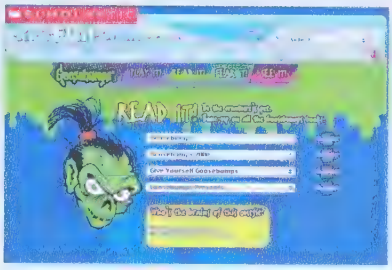
Dialogues

Material consulted | Appendix A

Children's websites

Figs. *(from left to right and top to bottom)* barbie.com; divastarz.com; pbskids.org/arthur; beverlycleary.com; elgarabato.com.ar; guysread.com; teletoon.com; habbohotel.co.uk; ytv.com; whatsherface.com





Figs. playhouse.com; place.scholastic.com

Figs. *(from left to right and top to bottom)* barbie.com; divastarz.com; beverlycleary.com; elgarabato.com.ar; habbohotel.co.uk; whatsherface.com; cartoonetwork.com

UNIVERSITY OF ALBERTA
FACULTY OF ARTS, SCIENCE & LAW
RESEARCH ETHICS BOARD

APPLICATION TO CONDUCT RESEARCH INVOLVING HUMAN PARTICIPANTS

Principal Investigator(s):

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Name/Department of Faculty Sponsor: Connie Varnhagen, Department of Psychology
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Project title: **Children visualizing discussion in online reading clubs:** Designing a visual tool for online group discussions that supports interaction, collaboration and dialogue about literature.

DATA IS TO BE COLLECTED OUTSIDE THE FACULTY OF ARTS

Ethics application | Appendix B

<u>Summary of Project / Research Design.</u> Please attach a more detailed proposal (i.e., 1-2 pages), including a description of the population from which research participants will be drawn (e.g., university students, nursing home residents) and a discussion of how research participants will be solicited. Also attach copies of research instruments (e.g., questionnaires, interview guides).

Reading clubs are collaborative environments where reading is experienced as a social activity. Based on the reader response theory, reading clubs foster awareness about the multiplicity of interpretations a text can elicit in different readers. Group discussions are considered to be the best method for the cooperative construction of meaning in order to understand literature.

Within live reading clubs children share the same physical space, which facilitates the flow of the dialogue. When the reading club is online, contributions are made in a different time and place. The lack of social presence and non-verbal cues, and the text-based linear formats used in existing online reading clubs do not support the interaction and collaboration needed within reading club dynamics.

Visualization tools could help children to understand the online discussions, making sense of the collaboration and the reading material. A visual tool that also shows the network created by their contributions and interrelationships might help children in developing a sense of community, motivating them to participate more.

The purpose of this project is to design a visual tool intended to support interaction, collaboration and discussion in online reading clubs. A paper-based prototype of this visual tool
will be developed as part of the Design Thesis Project in partial fulfillment of the requirements of the Master of Design at the Department of Art and Design.

The study will take place at the Child Study Centre, during the English Language Arts class (Grade 5/6), and will consist of three phases:

<u>Phase I: Introduction</u> (30 minutes)

The principal investigator will visit the class to introduce herself to the students. The purpose of this visit is to introduce the activity and to hand out copies of the testing materials—short story and "discussion toolkit." *

<u>Phase II: Activity</u> (90 minutes)

- **Introduction** (20 minutes). The principal investigator will explain the activity.

  Examples will be demonstrated.*
- **Discussion** (40 minutes). Group discussions about a short story, aided by a "discussion toolkit."
- **Group presentation** (30 minutes). Group presentation of the work done.

Phase III: Participatory Design (90 minutes)

- **Questionnaire** (25 minutes). Individual completion of a questionnaire.*
- **Participatory design** (35 minutes). Group work. Re-designing the "discussion toolkit".
- **Presentation** (15 minutes). Group presentation of the work done.
- **Concluding discussion** (15 minutes). Group conversation about the experience.

* *See more details in Research Proposal attached*

Assessment of Risk to Human Participants

This study will take place at the Child Study Centre, with the permission and cooperation of the Director of the Centre, Dr. Sue Lynch, and under the supervision of the teacher (see appendix 8, Child Study Centre approval).

Participants for this study will be 23 children (13 in grade five, 10 in grade six) attending the Child Study Centre. The study will take place during the English Language Arts class.

The risk to children participating in this study is minimal and is no greater than might be expected within a regular English Language Arts class. The teacher in charge of the class will be present during the activities. She/he will monitor the activities and will ensure that all children are at ease. The principal investigator will conduct the study aided by five research assistants (graduate students in Visual Communication Design).

Children's participation in this study is voluntary under the agreement of their parents/ guardians (see appendix 7, Consent Form). Children can refuse to participate. They can withdraw at any time without any consequence. Children's data will be an anonymous part of group results.

Description of Procedures to be Undertaken to Reduce Risk to Human Subjects. *Please attach copies of consent forms and other similar documents.*

Written material/Content

The study will involve the reading of a short story (see appendix 3, Short Story). The risk of finding the text disturbing is minimal, and is no greater than might be expected within a regular English Language Arts class. The text was selected under the supervision of Professor Joyce M. Bainbridge.

Peer interaction

Students will engage in discussion with their peers. The risk that these dialogues may contain disturbing comments is minimal, and is no greater than might be expected within a regular face-to-face discussion in an English Language Arts class. Evaluator, teacher and research assistants will monitor the content of the dialogues. Should they find any problem with the content or the tone of the dialogues, they will stop the activity and inform the parents.

Anonymity and confidentiality

Voice recording and still camera will be used to record the experience. Voice recording will not be made public. This material will be collected only to analyze the experience and as a backup of written notes. Still images will be used for the Master of Design Thesis Project exhibit, presentations and in written articles. Written consent from the parents/guardian and children will be collected (see appendix 7, Consent Form). Should the researcher quote any of the contributions or comments, pseudonyms will be used to grant anonymity to the participants.

I have read the UNIVERSITY OF ALBERTA STANDARDS FOR THE PROTECTION OF HUMAN PARTICIPANTS (GFC Policy Manual, Section 66) and agree to abide by these standards in conducting my research.

_____ **Signature of Principal Investigator**

_____ **Date**

(If Student)

_____ **Signature of Faculty Supervisor**

_____

Date

Submit completed form and attached documents to:
Dr. Lynn Penrod, Chair
Arts, Science, Law Research Ethics Board
Office of the Dean of Arts, 6th Floor, Humanities Building
mailto: lpenrod@ualberta.ca / Phone: 492-3584

Children visualizing discussion in online reading clubs

Designing a visual tool for online group discussions that supports interaction, collaboration an dialogue about literature.

Constanza Pacher
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MDes, University of Alberta
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RESEARCH PROPOSAL

The purpose of this project is to design a visual tool intended to support interaction, collaboration and discussion in online reading clubs. A paper-based prototype of this visual tool to aid discussions will be developed and tested in order to assess its performance. This study will simulate an online discussion about literature. Children's needs regarding tools to aid discussion and discussion dynamics will be examined. This study will also involve some preliminary qualitative assessment of the effectiveness of this approach regarding motivation and quality of responses regarding growth in responding to literature. The findings will be used to help design a prototype for a website, an online reading club for children.

Participants

Participants for this study will be 23 children attending the Child Study Centre (13 in grade five, 10 in grade six).

Settings

The study will take place at the Child Study Centre, during the English Language Arts class. Children will work in groups of four to five students each. Each group will be monitored by an adult (principal investigator and five research assistants—graduate students in Visual Communication Design).

Materials

Foam boards, push pins, notepads, black markers, pens, color pencils and color markers, sheets of white paper, glue.

Procedure

Day 1

Phase I : Introduction

Duration: 30 minutes

The principal investigator will visit the class to introduce herself to the students. The purpose of this visit is to provide a quick introduction about the activity. The principal investigator will explain to the students what she is working on and what will they do during her next visit. She will show the "discussion toolkit" they will use during the. Copies of a short story will be handed out. The chosen short story is "Garbage Creek," by W. D. Valgardson. The selection of the reading material was supervised by Professor Joyce M. Bainbridge (Department of Elementary Education, University of Alberta), who considered the text appropriate for the age group. They will be asked to read the text for their next meeting, and they will be encouraged to think about the reading, write down main ideas and produce and/or collect some materials related to the story (drawing, pictures, etc.). The reading of the text will be required to participate in the activity.

Day 2

Phase II : Activity

Duration: 90 minutes

Introduction (20 minutes)

The principal investigator will explain to the students that they will be part of an activity that is similar to what people do in an online reading club. They will be told that they will be able to share their thoughts and ideas about the short story with their group. They will be told that they have to try to communicate without talking, using a set of visual tools provided. The discussion will be

performed through writing and posting messages on a board. The principal investigator will show the "discussion toolkit" they will use during this activity, and explain how the tools work and what are they expected to do with them. An example will be demonstrated.

Discussion (40 minutes)
The principal investigator and/or teacher will start a brief discussion with the children about the reading as a means of "warming-up". Questions about the story will be used as starters. Then, each group will get together and the research assistants will start the discussions by posting the first question on the board. Children will be encouraged to comment and produce written and drawn responses aided by the "discussion toolkit".

Presentation (30 minutes)
Each group will show their boards to the rest of the class and explain what they did.

Day 3

Phase III: Participatory design

Duration: 90 minutes

Questionnaire (25 minutes)
Individual questionnaires will be distributed. The purpose of this questionnaire is to collect responses concerning specific aspects related to the experience, and as means of reflection and focus for the next activity.

Participatory design (35 minutes)
Children will work in groups of four to five students. They will be asked to "design" or "re-design" the "discussion toolkit" with the aim of improving it. They will be asked to think about what tools they need for discussion and overall organization of the toolkit. Research assistants will be available to help during the design activity.

Presentation (15 minutes)
Each group will show their designs to the rest of the class and explain what they did.

Concluding discussion (15 minutes)
The purpose of this conversation with the whole groups is to collect responses concerning specific aspects related to the experience and the prototype.

Data collection and analysis

The experience will be recorded using voice recorders and still camera. Voice recordings will not be made public. This material will be collected only to analyze the experience. Still images will be shown at the Master of Design Thesis Project exhibit, presentations and in written articles. Written consent from the parents/guardian and children will be required. Should the researcher quote any of the contributions or comments, pseudonyms will be used to grant anonymity to participants.

Data collected from the observation of children in action and conversations, and written material recorded in the group discussions will be examined in order to analyze the performance of the discussion tools that facilitate the discussion dynamics. This analysis will be used to help design a prototype for an online reading club.

Protocol I

Hello, my name is Constanza. I am a graduate student in Visual Communication Design. I am here today to tell you a bit about what I am working on. I am designing a reading club for children on the Internet. A reading club is where you read stories and talk about them with other kids. I am going to give you today a short story to read at home, and next time we get together, we will participate of this reading club and we will have a discussion in groups about the story.

This reading club is on the Internet, but I am using paper to study how things will work before going to the computer.
The discussion you will have is a different discussion; you will have to communicate without talking. This is because we will pretend we are using the computer to communicate with others—and when you are in the computer, you communicate through writing and sending messages.

[showing the "discussion toolkit"] To help you communicate, you will use the "discussion toolkit". You will write messages and post them in the board. You see that this toolkit contains "tools". I will explain this tools in more detail next class.

[handing out copies of the toolkit] I am going to give this to you now, so you can take it home and take a look.

[handing out copies of the text] For next class you will have to read the short story "Garbage Creek". As we are going to talk about this story, please think about it. You can write down the main ideas, or questions about the story. You can underline in the photocopy some parts that interest you. Also, if you want, you can make drawings about the story, or collect some things that relate to the story (pictures in a magazine, maps, etc.).

The only thing you have to do to participate in this reading club next class is to read the story. Do you have any questions?

It will be fun, and my assistants and myself will be here to help you with whatever you don't understand. It won't be a test of your abilities; you will be helping me find out what is working and what is not working so well, so I can make it better.

If you don't feel like participating, Brad and Brenda have some other tasks for you to do, so don't feel pressured to accept. You have to just let them know that you prefer to do something else.

How many of you already decided to do it? How many of you already decided not to do it? Take your time, you might want to read the story and decide next class if you want to participate or not.

Protocol II

Hello again. I am Constanza and these are _____ (name assistant 1), _____ (name assistant 2) and _____ (name assistant 3), _____ (name assistant 4) and _____ (name assistant 5). They are students too and they will help me today. As I told you last time, we are designing a reading club for children on the Internet. We are asking you today to help us find out what is working and what is not working so well. This is not a test of your abilities, so any time you don't understand something ask us, and we will help you.

A reading club is where you read stories and talk about them with other kids. Today you will have a discussion with your group about the short story you read at home. This will be a different discussion; you will have to communicate without talking. This is because you will be pretending you are using the computer to communicate with others, and when you are in the computer, you communicate through writing and sending messages.
To help you communicate, you will use the "discussion toolkit". This toolkit contains six "tools" that you can use to communicate your ideas to the group. I will tell you about this now and then we will show you an example of the discussion using the tools.

[assistants show tools]

• New Topic is the tool you can use to start the discussion, and every time you want to change the topic. You can write down a title of the new topic, or make a "big question" to start the discussion.

• Speak Up is the tool to talk. You can use it to share your thoughts, ideas and feelings about the story, the characters, an event that interests you, etc.

• Agree is the tool you can use to agree with someone else's comment or opinion. You will have to say who are you agreeing with, and why. E.g.: "I agree with Connie, because..."

• Disagree is the tool you can use to disagree with someone else's comment or opinion. You will have to say who are you disagreeing with, and why. E.g.: "I disagree with Connie, because..." This will not mean that person is wrong; it will mean instead that you have a different opinion.

• Question is the tool to ask questions. You can use it to ask about something you don't understand, something that you don't know, etc.

• Pictures is the tool to show your ideas with images. You can use it to illustrate an idea in the discussion, or just to show to your group how you interpret the story visually. You can make a drawing, a map, a chart, a comic, attach a photograph, etc.

And now that you know about the tools, I will explain to you how the discussion game works.

[assistants demonstrate]

- Each of you will have one discussion toolkit.
- Each group will share a board. The discussion will happen through placing messages on that board.
- Each of you will have a character that will identify you throughout the discussion.

Every time you want to say something, you will:

1. choose the tool you want to use and place a sticker on the notepad,
2. write your message—or make a drawing—on the notepad,
3. place a sticker on the notepad with the picture of the character that identifies you, and
4. place the message on the board.

When another participant wants to respond to you, that person will place the message next to you and draw a line with the marker, from that message to yours. This will mean that this person is responding or talking to you.

There is no turn taking. When you have something you want to say, you write your message and place it on the board.

You will do this for half an hour. Then, each group will show to the rest of the class their boards full of messages, and they will explain what they did.

The important thing is that you try to discuss and explore the story the more you can, so you have lots of things to show.

Who wants to do it? Who wants to do something else? There's absolutely no problem if you prefer to work with Brad and Brenda in something else. They have other task prepared for you to do if you don't want to participate in this activity. Maybe next class you want to join us... we will be drawing!

Do you have any questions before we start? We will place the first message on the boards to start. It will be the first topic for discussion. Feel free to add your message to this topic or to start a new topic if you prefer.

Protocol III

Hello everybody! Today we will do the last part of the activity. Last class we played with the "discussion toolkit". Today, you will help me to think about what can we change in the discussion toolkit to make it better. Is it the tools? Is it the characters? Is it the way we post messages in the board? The connections? You will be the designers today! We will give you big sheets of paper and markers and you will draw there your ideas.

First, you will answer a questionnaire that we prepared so you can remember what happened last class. This questionnaire have questions about the "discussion toolkit". How did you like it, if you understood the tools, the characters, etc. It is easy and we can help you with whatever you don't understand. After you complete the questionnaire, we will draw and design together a better "discussion toolkit".

Who wants to do it? Who wants to do something else? There's absolutely no problem if you prefer to work with Brad and Brenda in something else. They have other task prepared for you to do if you don't want to participate in this activity.

Consent Form

Dear Parent or Guardian,

Learning how to enjoy reading and developing critical thinking skills and communicational skills are essential for children's development. Literature circles or reading clubs have been used in the elementary classroom for many years. The advent of the computer had an enormous impact on distant education, and reading clubs became online too. The existing online reading clubs present a rigid text-based format that appears to fail in supporting the interaction and collaboration needed within reading club dynamics.

We would like to ask your permission to allow your child to participate in a study that will explore how children communicate and discuss within reading clubs, with the aim of "translating" afterwards these findings in the design of a website for a reading club online. This study will be conducted as part of the Master of Design Thesis Project, Department of Art and Design at the University of Alberta.

The study will take place during the English Language Arts class. The activity will be done with paper-prototypes of the website, simulating an online discussion. There won't be computers involved in the study. This study will be divided in three phases:

Phase I: Introduction (30 minutes)

The principal investigator will visit the class to introduce herself to the students. The purpose of this visit is to introduce the activity and to hand out copies of the materials—"discussion toolkit" and a short story to be read at home. Children will be encouraged to think about the reading, write down main ideas, make drawings and collect some material related to the story. Children will need to read the short story to participate in the study.

The short story is "Garbage Creek", Garbage Creek and other stories, W. V. Valgardson, Groundwood Boooks, Toronto 1997—it was selected under the supervision of Professor Joyce M. Bainbridge (Department of Elementary Education, University of Alberta).

Phase II: Activity (90 minutes)

- Introduction (20 minutes). The principal investigator will explain the activity. Examples will be demonstrated.
- Discussion (40 minutes). Silent group discussions about a short story, aided by a "discussion toolkit"—it contains tools to participate in a discussion, such as "New Topic", "Speak Up", "Agree", "Disagree", etc. The child works on his/her "discussion toolkit" and place his/her message on a board that he/she shares with the group.
- Group presentation (30 minutes). Group presentation of the work done.

Phase III: Participatory Design (90 minutes)

- Questionnaire (25 minutes). Individual completion of a questionnaire.
- Participatory design (35 minutes). Group work. Re-designing the prototype.
- Presentation (15 minutes). Group presentation of the work done.
- Concluding discussion (15 minutes). Group conversation about the experience.

The teacher in charge of the class will be present, monitoring the activities and making sure that all children are at ease. The principal investigator will conduct the study aided by five research assistants (students in Visual Communication Design).

The risks of this study to students are minimal, and no greater than might be expected within a regular English Language Arts class. Evaluators and teacher will monitor the content of the dialogues. Should they find any problem with the content or the tone of the dialogues, they will stop the activity and inform you.

Voice recording and still camera will be used to record the experience. Voice recording will not be made public. This material will be collected only to analyze the experience and as a backup of written notes. Pictures that show your child's face may be shown at the Master of Design Thesis Project exhibit, public presentations and in written articles. Your child will not be identified by name. Should the researcher quote any of the contributions or comments, pseudonyms will be used to grant anonymity to participants.

Your child is free to refuse to participate, opt out or withdraw at any time without any consequences.

This project is being reviewed by the University of Alberta, Faculty of Arts, Science & Law Research Ethics Board and has the support of the director of the Child Study Centre, Dr. Sue Lynch. If you have any questions regarding procedures, activities, questionnaires, or any other concern, please feel free to contact the principal investigator, Constanza Pacher (Visual Communication Design graduate student, Department of Art & Design, University of Alberta) at 425-4326 or mpacher@ualberta.ca, or her supervisor, Prof. Bonnie Sadler Takach, at 492-7859 or bbs@ualberta.ca.

The written report will be made available to anyone who is interested in knowing about this research.

Your cooperation in this project is greatly appreciated. If you agree to have your child participate, please sign the attached permission form and have your child return it to the teacher at your earliest convenience. Thank you very much for your time and consideration.

Sincerely,

Constanza Pacher
VCD Graduate Student
Department of Art & Design
Faculty of Arts,
University of Alberta
mpacher@ualberta.ca
425-4326

Ethics application | Appendix B

University of Alberta Consent Form

I, _____, hereby consent
(print name of parent/legal guardian)
for _____
(print name of student)

to participate in the study concerning reading clubs online, a research project lead by Constanza Pacher (Department of Art & Design, University of Alberta), which will be conducted as part of the Master of Design Thesis Project.

I understand that:

- The study will take place during the English Language Arts class, in three phases.
- My child may withdraw form the study at any time without penalty.
- My child's voice will be recorded. Voice recordings will not be made public.
- Pictures that show my child's face may be shown at the Master of Design Thesis Project exhibit, public presentations and in written articles. My child will not be identified by name.
- Should the researcher quote any of the contributions or comments, pseudonyms will be used to grant anonymity to my child.
- All information will be treated confidentially and it will be used to analyze the experience.
- My child's data will be an anonymous part of group results.

I also understand that the results of this research will be used only in the following:

- Written Master in Design thesis
- Master in Design Thesis Project exhibit
- Public presentations and written articles that may be published

_____ _____

(signature of parent/legal guardian) Date signed:

Please, remove this Research Consent Form and return it to the teacher.

Please, keep the letter for information.

Testing materials | Appendix C

Discussion toolkit

Figs. Discussion toolkit and testing materials.

Short Story

Garbage Creek and Other Stories (Print-Anthology)
Valgardson, W. D.
Douglas & McIntyre/Groundwood
1997

"(CAN) The eight stories in this collection describe the adventures of young children in outdoor Canadian settings. The stories present positive portrayals of children solving problems and achieving degrees of maturity. The author's use of humour and conversation, as well as the inclusion of black and white illustrations, make this an engaging resource. Suggested Use: Grade 4; Grade 5; Grade 6; Short Stories." *English Language Arts K-9 Learning Resource Materials Update.* Prepared by: Instructional Resources Unit Curriculum and Instruction Branch Saskatchewan Education, February 1999.

Garbage Creek and Other Stories
by W. D. Valgardson

GARBAGE CREEK

Not wanted. That's what Jim was thinking as he kicked a can down the road. With every kick it went spinning away.

Not wanted. Not any more. Now all they could talk about was the baby this and the baby that.

His mom was always saying, "I'm too tired to read to you. Don't make so much noise. Go play

quietly." The baby always needed her diapers changed. She was always eating. If she didn't eat so much, she wouldn't need her diapers changed so often.

Jim gave the can another kick. It went flying through the air, off the trail, down the slope and into the creek. He ran down after it. Stupid can, he thought.

He was surprised to see a girl sitting on a rock. He really didn't want to talk to anyone but she was holding the tin can.

"This yours?" she asked.

"Yeah," he said, taking it.

"I'm Angie. I live up there."

"Jim." He pointed back along the creek. "What're you doing?"

"Looking for arrowheads."

He looked around. It was just a little creek with a bunch of junk dumped into it. He sat down on an old tire.

"You want to go to the salt chuck?" Angie asked.

They followed the stream, hopping from rock to rock, wading in the water sometimes. The trees hung over the stream on both sides. They startled a couple of dippers that were looking for insects in the gravel bottom. When they got to the salt chuck, there was a field of grass. There were wild rose bushes and blackberry brambles. They stopped to pick

blackberries. They saw a crane and some mallards.

"There used to be salmon in this creek," Angie said on the way back.

"This little thing?"

They searched for arrowheads but didn't find any. Instead they found some tin cans and bottles and plastic. They kept the drink cans and bottles and threw the rest of the garbage onto the bank.

"You're sure there's arrowheads here?" Jim said.

"I've got six at home. Two aren't so good but I've got four good ones. One's red and two are white and one is blue. There's supposed to be a midden but I haven't been able to find it."

That night the baby cried all night. It didn't fall asleep until morning. Jim made himself a peanut butter and jelly sandwich for breakfast. Then his mother chased him outside because she didn't want the baby wakened up.

"You came back," Angie said when he arrived at the creek. "I thought you said there was no point looking for arrowheads here."

"You got any brothers or sisters?"

"Four. They've all moved out. They're too busy to do anything with me."

"I'll give you my sister." Jim had brought a garden trowel. They used it to dig in the gravel and along the bank. They found clam and mussel shells. They found an animal bone that was broken on one

end. Angie said that meant someone had dug out the marrow.

As they searched, they kept picking up garbage and tossing it onto the bank.

"No wonder the salmon don't come here any more. I wouldn't, either," Jim said disgustedly. "Look at this." It was the rusted front wheel of a bicycle. He heaved it out of the water. "They call this Sugar Creek. I think they should call it Garbage Creek."

"How come you spend your time down here?"

"There's no place at home for me. How about you?"

"No reason. Just there's never anyone there. Me and the TV."

Jim picked up a plastic grocery bag. He started putting bits of junk in it. "You really think the Indians used to camp here? I looked up midden in the dictionary."

"My dad said my grandpa's dad used to come here in the fall to spear salmon. They'd come down in their canoes and set up camp. It's not Indians. It's Cowichan. My dad's Cowichan."

They wrestled part of an old fridge out of the water.

"You know," Jim said. "About the salmon. Do you think, I mean, if you and me got rid of the junk..."

Angie sat down on a rock. "I've been wanting to try but there's just been me and I can't move some of the big things. Two can do a lot more than one."

After that, they met every day at the stream. Every day they pulled out garbage and raked over the gravel. Sometimes they found things people had thrown into the water the night before. Jim made signs saying "No littering" and nailed them up on some sticks.

"How's your sister doing?" Angie asked one afternoon.

"Noisy. She's always crying. My mom's always changing her diapers and giving her a bottle. She wakes them up at night and then they're grouchy in the morning. What about your parents?"

"Working. My dad's a carver and he's always going places to show his carving. My mom works for the government."

They met nearly every day for the rest of the summer. They made a trip on their bikes out to the Salmon House and watched all the movies and studied all the displays. They took the bus to the library and read books on salmon. They borrowed their parents' shovels and rakes. They saw belted kingfishers. One day they counted six eagles. As they were cleaning up the creek, they saw crayfish and diving beetles.

"Those are called water tigers," Jim said, showing Angie a diving-beetle larva.

They were still looking for arrowheads. They found some chipped flakes of rock and a stone that might have been used as a hammer. They took a couple of days off to go to Totem Pole Park and the provincial museum. They looked at the masks and sat in the longhouse.

"My dad makes masks like that," Angie said. "And pictures and stuff."

"My dad has a computer business. People are always calling with problems."

"I'm Cowichan and Scots. What about you?"

"Canadian."

"Me, too. But the other stuff. Before you got here."

"Ukrainian. Polish. My dad says my mom is the peroghi princess."

On one of their trips to the library, they stopped at the Ukrainian center and Jim showed Angie some books written in Ukrainian. "Crazy alphabet, eh?" They went downstairs and watched some dancers practicing for a concert.

"Can you talk Ukrainian?"

Jim counted on his fingers. "Six words. Can you talk Cowichan?"

Angie counted on her fingers. "Eight."

"I'll teach you six Ukrainian words if you teach me eight Cowichan."

They went back to their stream. They kept hauling out junk and raking over the gravel to get rid of the clay someone had dumped. One day they hiked to a second larger creek. It was too big and deep to cross. They stood on the bank looking at it. It was clogged with debris from logging. Garbage was caught among the branches and small logs.

"I looked this one up," Jim said. "It's called Washing Creek. It used to have salmon, too. Lots of them."

September came and it was time to go back to school. They visited their stream on weekends. But Jim had a job delivering flyers and Angie was involved in sports so they weren't able to make it every weekend.

"Hey, guy," his dad said one day. "What's so interesting about the sky? You keep looking up all the time, you'll get a crick in your neck."

"Rain clouds," Jim said. He was thinking about how the salmon would be returning soon and they needed water.

The baby had an ear infection. She'd been crying for days. That meant a trip to the doctor. Then they all went shopping for a crib. When they came out of the mall, it was raining.

After that it rained pretty regularly. On the last weekend in October, Jim met Angie at the bus stop and they took the bus out to Goldstream Park. The

salmon were running. The parking lot was jammed. There were people lined up all along the river bank. Clouds of seagulls filled the air. Maple leaves as big as plates were twirling to the ground.

They walked along the river bank. They could see the backs of the chum sticking out of the water. There were lots of them. Here and there were the cherry-red backs of the coho.

"It's too crowded," Jim said.

They took the bus back. Neither one said much. They were thinking about Garbage Creek. About all the work they had done. They walked to the stream, sort of hurrying, then slowing down, like they wanted to get there but they didn't want to get there.

The rain was coming down steadily. There was a foot of water in the stream. They walked along the bank.

"No more fish than arrowheads," Jim said disgustedly.

"Maybe it's been too long. Maybe the fish forgot there's a stream here."

"Maybe we need to do a salmon dance."

"Don't know one."

The next day Angie took two bags out of her packsack. Carefully, she unfolded tissue paper. First she took out one mask, then another. They were carved from cedar and were painted in bright colors. One was a salmon mask. The other was of a beaver.

"These are mine," she said. "I've got eagle and killer whale, too, but I thought they'd frighten the salmon. Maybe if we wear these, the fish will remember. Maybe the stream will look like it did a long time ago."

They went to where the stream and the salt marsh met. They sat side by side in the tall grass and held the masks over their faces.

Suddenly, Angie grabbed Jim's arm. She put her finger to her lips, then pointed.

There, just inside the entrance, hiding under the overhanging bank, were two coho, their tails slowly moving back and forth. Cautiously, the fish edged into the stream. They moved forward, then let the current push them back. In a sudden burst the female made a dash forward. The male followed. Then the female stopped, turned on her side and began to beat the gravel violently with her tail.

"She's making a redd," Jim whispered excitedly.

The female kept beating at the gravel until there was a small depression. She tested the depth with her tail. She lay over it and they could see her laying the eggs. Then the male swam forward to fertilize the eggs. The female rushed ahead and began to make a new nest.

Angie and Jim watched for hours. The female's

tail gradually became tattered. Both fish lay still in the current.

"They're tired," Angie said. "All that work to make a nest and have some babies."

Angie and Jim came back to the stream the next day and the next. Gradually, the two fish became covered in white blotches. On the third day, both fish were floating in an eddy.

"It's not fair," Angie said.

"No." Jim was sitting on a rock. He'd got so he thought of the two salmon as his salmon. "Lots of things aren't fair. They just are."

During the winter, because they went to different schools and were busy with homework and sports and clubs, they only got to meet at the creek occasionally. The trees had shed their leaves. The water looked cold.

One Friday Jim called Angie and asked her to meet him at the creek. He felt sort of shy. They hadn't seen each other for awhile. They both said hello. They asked each other about school.

"How're things going at home?" Angie asked.

"Okay, I guess. She's crawling around and she can just about say something. She wants to climb on top of me when I'm lying on the floor watching TV. I'm helping her learn to walk. How about you?"

"My oldest brother took me to a rock concert in Vancouver."

"The eggs should be hatching now," Jim said. "I wrote it on my calendar." He took out a pamphlet he had got on salmon. They searched but couldn't find anything.

"They're too little," Angie said. "They're still alevins. They're hiding under the gravel. We've got to wait until April."

Jim checked the creek every couple of weeks. He saw a mink and a deer and a number of cranes but no salmon fry. Then, the first week in April, Angie called him. They met at the creek on a Saturday morning.

They were standing in the water, peering down. All at once, Jim shouted, "Look! There they are."

Salmon fry scattered through the water.

Jim laughed. "We're parents." He felt embarrassed. "I mean...you know what I mean."

"Grandparents. Next year we'll be great-grandparents."

There weren't a lot of fry. But there were some. Jim and Angie looked up and down the stream. Someone had thrown some paper cups into it in spite of the signs. They picked them up and put them in a garbage bag.

They crouched down to watch the fry dart about.

"Ours," Angie said. "We did it. They wouldn't be here if it weren't for us."

Jim nodded and grinned. "We never found any arrowheads though."

Angie reached into her pocket. "Put your hand out," she said. "I brought you something." She took her hand out of her pocket, then held it over his. She put something in his hand. It was her blue arrowhead.

He put his hand in his pocket. He took out a wooden doll. He turned the top. It came apart. Inside was another little doll. He opened this one and there was another doll inside. "I brought you something, too," he said and gave it to her. "To celebrate."

They both looked at the water. Here and there they could see the fry darting back and forth.

"We've still got work to do," Angie said. "They're going to be here for a year before they go to sea. You and me, we're going to have keep Sugar Creek clean for them. And maybe even another pair will turn up in the fall."

"Being a parent is hard work," Jim said, laughing. He looked at Angie. Maybe, he thought, if his sister turned out like Angie, it wouldn't be so bad having her around after all.

Questionnaire

Circle your answer

1. Did you enjoy the activity? **(Rate: circle one)**

   Not at all **1** **2** **3** **4** **5** Very much

   Why or why not?

2. Did the discussion help you understand the story better?
   (Rate: circle one)

   Not at all **1** **2** **3** **4** **5** Very much

   Why or why not? How?

3. Did the discussion help you realize of things in the story that you hadn't thought before? **(Circle Yes or No and explain why)**

   Yes **No**

   Why or why not? How?

4. Did the discussion on the board help you see who was talking? **(Circle Yes or No and explain why)**

Yes **No**

Why or why not?

5. Was the discussion toolkit easy to use? **(Circle Yes or No and explain why)**

Yes **No**

Why or why not?

6. Are the tools easy to understand? **(Circle Yes or No and explain why)**

Yes **No**

Why or why not?

Yes **No**

Why or why not?

Yes **No**

Why or why not?

Yes **No**

Why or why not?

Yes **No**

Why or why not?

7. Would you like to have different tools? Which ones?
   (You can draw if you want to)

8. How do you like the drawings of the children to identify yourself during the discussion? **(Rate: circle one)**

   Not at all **1** **2** **3** **4** **5** Very much

   Comments?

9. What would you like to use to identify yourself in a Reading Club on the internet? **(Circle all that apply)**

   (a) a photograph of you
   (b) a drawing of you that you made
   (c) an animal
   (d) an alien
   (e) your name
   (f) other?
   Say what :

10. Do you like reading? **(Rate: circle one)**

    Not at all **1** **2** **3** **4** **5** Very much

    Why or why not?

11. Do you like using the computer? **(Rate: circle one)**

    Not at all **1** **2** **3** **4** **5** Very much

    Why or why not?

12. Would you talk to kids from other places in a reading club on the Internet?
(Circle Yes or No and explain why)

Yes **No**

Why or why not?

13. Do you participate in clubs online, forums, chat rooms, etc.?
(Circle Yes or No)

Yes **No**

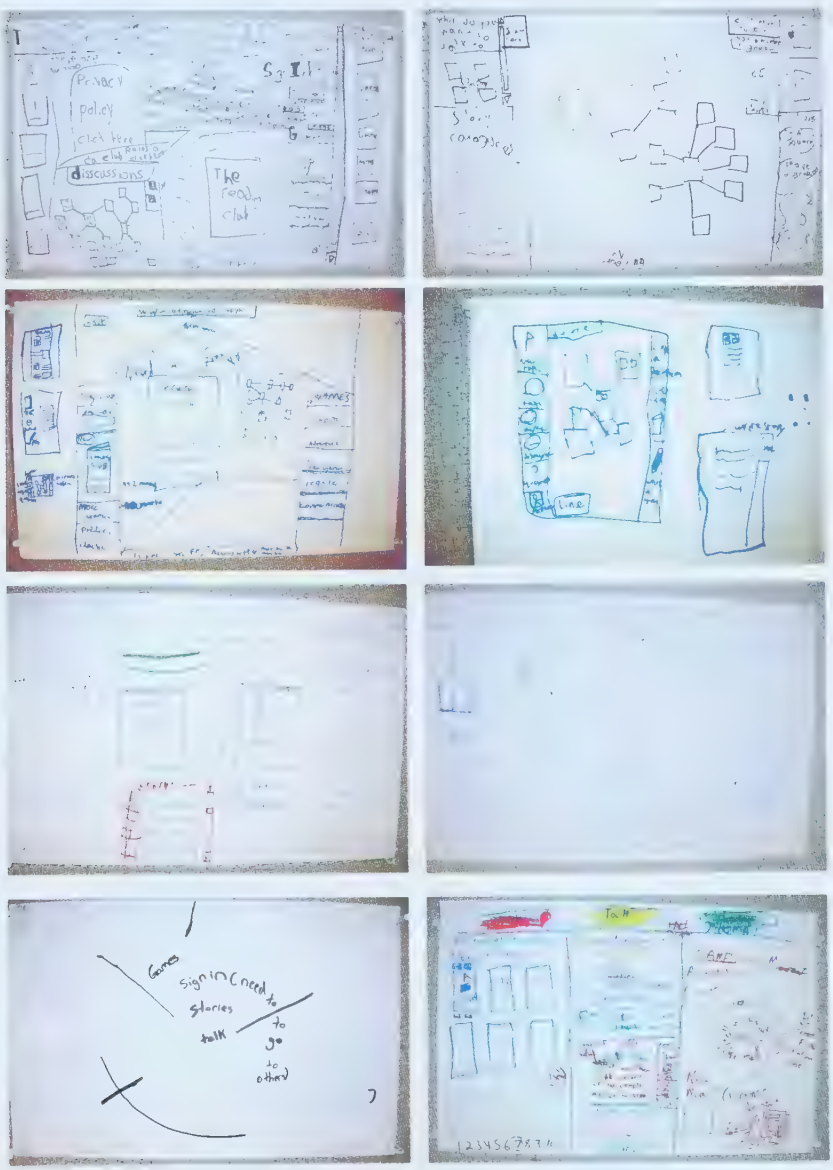
Which ones?

14. Do you have a computer with Internet connection at home?
(Circle Yes or No)

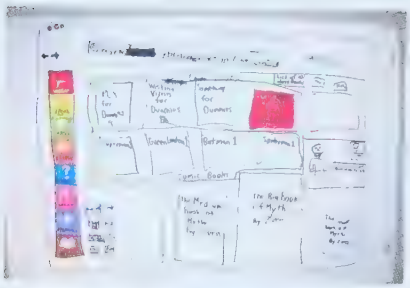
Yes **No**

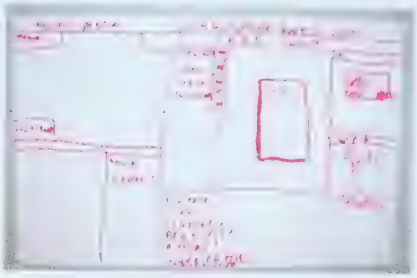
Data collected | Appendix D

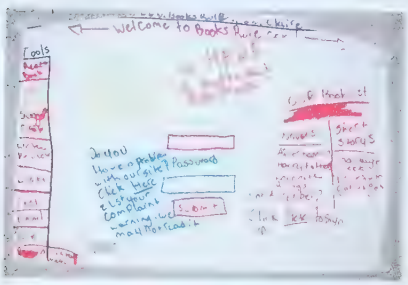
Rapid low-tech prototypes made by children during the participatory design session

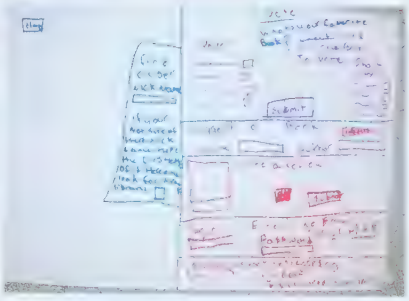


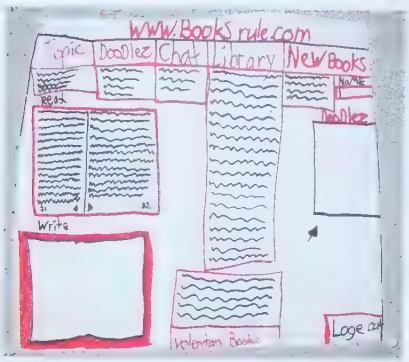
Data collected | Appendix D

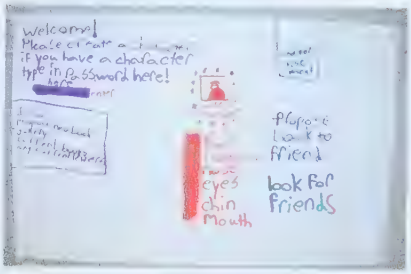


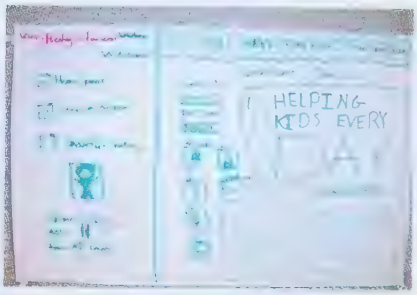


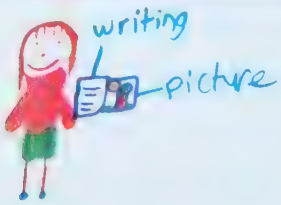












Data collected | Appendix D

Questionnaire responses

1. Did you enjoy the activity?

student	answer	comment
1	5	Because I like writing and it was fun communicating
2	5	[I enjoyed] writing and drawing pictures.
3	5	Because you can tell people something without talking
4	5	It had just the right amount of complexity and was very flexible
5	4	I liked this activity because it was not too hard and not to easy
6	4	I enjoyed it because we got to express our feelings
7	4	It was a little boring when there was nothing to say
8	3	Just some parts it was a little bit boring
9	4	It was fun to see everybody's ideas
10	4	It was fun in general, I'm not sure why
11	1	Because after I read something I don't enjoy talking about it
12	4	I think the idea was great but it could be improved by getting more characters
13	1	I thought it was boring and not fun
14	4	It was good to know people's opinions but sometimes we got off topic
15	5	Because if was fun
16	4	I liked it a lot; it just got a little messy
17	3	I enjoyed it but I think it's a good idea to pick your own character and topic.
18	3	Sometimes was really boring because there was nothing to say but other than that it was pretty good.
19	5	[Very much] because I thought it was a fun way to discuss a story.
20	3	I thought it was OK but have found better things to do
21	5	[Very much] because it was fun to talk to other people online about a specific topic that we could change.

2. Did the discussion help you understand the story better?

student	answer	comment
1	1	Because we only talked about the environment
2	5	Yes it did [help] because it was clear
3	3	Because some questions I had none knew the answer to either
4	5	When people answered your questions you could understand the story better
5	4	Yes it did [help] because it helped me out
6	5	It did [help] because everybody knows a part of the story
7	1	Because I understood the story already
8	5	Well, I understood the story already
9	1	It made me forget the story
10	2	We were very off topic most of the time. All of our questions didn't get answered
11	1	It did not [help] because we went off topic a lot
12	1	I did not like the story and did not wish to discuss it until the middle of the session
13	1	Because they only said what was in the book
14	1	But it told me other people's understandings
15	1	The story helped me a lot
16	3	Sort of it was more fun than learning
17	1	I already understood the story
18	1	We were just talking about it and that doesn't help
19	1	[Not at all] because they were explaining things I already knew
20	2	We weren't actually talking about the story. We were just talking about the environment
21	3	Because the questions that I wanted to know weren't usually answered appropriately.

3. Did the discussion help you realize of things in the story that you hadn't thought before?

student	answer	comment
1	Yes/No	It was both. I didn't learn much but talked a lot (on the board)
2	Yes	[It helped me realize] about the environment
3	Yes	Because they looked at the story in a different way than me
4	Yes	Someone was talking about swans. Where did the swans come in?
5	—	Don't know
6	No	Because I already realized everything
7	No	I don't know
8	No	—
9	No	It was the same things I thought
10	No	We were off topic
11	No	Because I understood the story the whole time
12	No	I read the book several times highlighting the parts I like
13	No	Because they only said what it was in the book
14	Yes/No	Not sure
15	No	They took my question
16	Yes	Well, because it had questions that made me think
17	No	Not many things to do with the story were mentioned
18	Yes	Because when I read the story I didn't think of some of our topics
19	Yes	It helped me realize things from the characters point of view
20	No	We were not literally talking to each other and it was not much about the story
21	No	I'm not exactly sure but I already realized what my group had stated

4. Did the discussion on the board help you see who was talking?

student	answer	comment
1	Yes	Because the lines were everywhere for some
2	Yes	Yes it did [help me]
3	Yes	Because then you could see who was talking to whom
4	Yes	You could identify it because of the photo ID
5	Yes	With the help of the lines
6	Yes	Because it was easy to understand
7	Yes	The lines were easy to read (?)
8	No	No comment
9	Yes	Because you can see everybody's names
10	Yes	The pictures helped a lot. When we ran out and had to write the names it was hard.
11	No	Because it was not organized
12	Yes	I found it easier the talking to each other
13	Yes	[The discussion on the board helped me] because of the lines
14	Yes	[The discussion on the board helped me] with the lines
15	Yes	Because I understand all of them
16	No	I found it hard to see who was talking because of all the lines
17	Yes	[Yes] because of the lines
18	Yes	Because there picture would be on the sheet and there would always see lines (?)
19	Yes	Because of the lines. They're easy to track who was talking.
20	Yes	Because the "photos" of people made it clear to see
21	Yes	Because I knew who had each different face

5. Was the discussion toolkit easy to use?

1	Yes	It was easy to use... stickers
2	Yes	It was easy
3	Yes	Because it was all set up already
4	Yes	It was simple and broad
5	Yes	Because it was right there and bright
6	Yes	Because they were simple
7	Yes	Because it was very straightforward
8	Yes	
9	Yes	It was very organized
10	Yes	They were the general ones you would use (?)
11	No	Because I kept placing things upside down
12	No	I think you could add more tools [and then in Q7, "No I thought there was too many']
13	Yes	Because it was right at your finger tips
14	Yes	Totally! It told everyone what you were going to say
15	No	I don't know
16	Yes	Yes it was, by maybe it could have an "answer" button
17	Yes	Because it was all explained
18	Yes	Because it's easy to figure out what they each meant
19	Yes	Because the tools are easy to understand
20	Yes	I thought it was easy to use because it was all ... (designed?)
21	Yes	Because everything on the toolkit was explained well

6. Are the tools easy to understand? > New issue

student	answer	comment
1	No	Because instead we used speak up
2	Yes	Because of the picture
3	Yes	Because it was brightly coloured it's easy to use
4	Yes	They are simply written in a language easier than old Shakespearean!
5	Yes	Because they are easy and fun
6	Yes	They were simple
7	Yes	Because they say what they are
8	Yes	They are explained very well
9	Yes	It gives a lot of things to do
10	Yes	Always use it
11	Yes	Because you could see it
12	Yes	It says the name on the button
13	Yes	Because there was a description
14	Yes	Very! Clearly written
15	Yes	Because they show all of the labels
16	Yes	Yes they were [easy to understand] because they covered most of the subjects. It was good to start new.
17	Yes	Because that way you know what the people are talking about
18	Yes	Because you just use it to start new topics
19	Yes	Because it clearly states that the person wants to talk about something else
20	Yes	This one looks easy but I never used it but it is just starting everything like a starting question (?)
21	Yes	Because if we get bored of one topic we can suggest a new one.

Data collected | Appendix D

Are the tools easy to understand? > Agree

student	answer	comment
1	Yes	Because it was easy to agree
2	Yes	Because it shows what one to get easier (?)
3	Yes	Because the picture of the happy face helps
4	Yes	You agree simply
5	Yes	Because it was a sticker
6	Yes	They were simple
7	Yes	Because it has a smiley face
8	Yes	—
9	Yes	If you want to agree you can
10	Yes	Always use it
11	No	I would put a brighter colour
12	Yes	I found this a good way to express my feelings
13	—	—
14	Yes	Clearly written and shown
15	Yes	Yes, this one is easy to understand
16	Yes	It made it simple to say yes
17	Yes	—
18	Yes	Because you can see it is used to agree with someone
19	Yes	Because it's easy to understand that the person share the same idea
20	No	It's hard to find what to agree with
21	Yes	Because I think that it is very helpful to explain why you agree or disagree

Data collected | Appendix D

Are the tools easy to understand? > Disagree

student	answer	comment
1	Yes	Because it was easy to disagree
2	Yes	Because of the colour
3	Yes	Yes, the face says all
4	Yes	You can disagree simply
5	—	—
6	Yes	They were simple
7	Yes	Because it was a sad face
8	Yes	—
9	Yes	You can disagree if you want to
10	Yes	Must accompany question and agree (?)
11	Yes	Because you can see it
12	Yes	I found this a good way to express my feelings
13	—	—
14	Yes	Very! Clearly written and shown
15	No	No it wasn't understandable
16	Yes	It was a good way of saying no and not too hard
17	Yes	
18	Yes	Because you can see it is used to disagree
19	Yes	Because it states that the person doesn't have the same opinion
20	No	It is hard to find who to disagree with
21	Yes	Because it is very helpful to explain why you agree or disagree

Data collected | Appendix D

Are the tools easy to understand? > Question

student	answer	Comment
1	Yes	Because we used it a lot
2	Yes	Because of the question mark
3	Yes	Because of the question mark you can tell what it is
4	Yes	Just ask a question! Easy and important
5	Yes	Because you could ask any question
6	Yes	They were simple
7	Yes	Because it was a question mark
8	Yes	—
9	Yes	It helps to know what peeps are thinking
10	Yes	Always use it
11	Yes	Easy to see
12	Yes	This helped me get others opinions
13	—	—
14	Yes	Clearly written and shown
15	Yes	Yes it was understandable
16	Yes	Yes, because that's how I could ask people all over the world! questions
17	Yes	
18	Yes	You use if for questions
19	Yes	Because it says "question" so if you put that up, somebody will know that you don't understand something
20	Yes	I found that this is hard to link to other topics. So they are just there to put down (?)
21	Yes	Because if you are curious and need to ask a question you can post it and it will be open to all

Are the tools easy to understand? > Pictures

student	answer	Comment
1	Yes	Because people knew you were on topic
2	Yes	Because of the picture
3	Yes	Because it has an icon on it
4	Yes	You draw a picture and explain it. How hard is that?
5	Yes	Because you could draw anything
6	Yes	They were simple
7	Yes	Because it has a picture on it
8	Yes	—
9	Yes	Get ideas
10	Yes	Necessary to understand better
11	No	I would get rid of his one because it is hard to draw on the computer
12	No	It would be too hard to draw on computers
13	—	—
14	Yes	Clearly shown
15	Yes	I really like drawing
16	Yes	It was fun to draw too!
17	Yes	
18	Yes	Because you stick it on your pictures
19	Yes	Because it states that you want to make a picture instead of talking
20	Yes	I thought that this was easy to link to others
21	Yes	Because sometimes it is easier to explain with drawings instead of words

7. Would you like to have different tools? Which ones?

student	answer	comment
1	Yes drawing	I would like to have an End Discussion tool and a Start New Discussion tool [drawing: end as in 'no enter' traffic sign and a traffic light in green saying 'go']
2	No	
3	No	
4	Yes	I would like to have a tool labeled "answer" to answer "questions"
5	No	No, I would not like to have different tools
6	Yes drawing	I would have an answer sticker [drawing: sticker that says 'answer' and it has a light bulb flashing]
7	No	
8	No	
9	No	[I] like [the] tools that you have
10	No	None
11	No	
12	No	I thought there was too many
13	Yes drawing	Answer [drawing: a letter A in caps followed by a colon]
14	Yes drawing	Answer [drawing: a letter A in caps]
15	—	Drawing, drawing, drawing, drawing
16	Yes drawing	Yes, an answer tool, to answer the questions [drawing: question mark upside down or exclamation mark]

8. How did you like the drawings of the children to identify yourself during the discussion?

student	answer	comment
1	3	
2	5	Yes, because of the person
3	5	Because they're all different, you can identify yours
4	5	They all have very distinguishable features, such as hat, hair, and shirts
5	5	I liked the characters a lot (I wish we could have kept the boards)
6	3	No comments
7	5	[circle "Connie"]
8	5	[circle "Connie", "Maria" and "Hyun"]
9	5	I got Chris and as you know my name is Chris
10	5	None
11	2	It would be nice if you could make your own person
12	3	They are life like names
13	5	
14	3	Wish we could make our own
15	5	I think you put lots of every in it (?)
16	5	Very much so, it was cool to kinda be someone besides you

9. What would you like to use to identify yourself in a reading club on the internet?

a. a photograph of you
b. a drawing of you that you made
c. an animal
d. an alien
e. your name
f. other?

student	answer	comment
1	a, b	Because it is easier to know who's talking
2	a	—
3	b, d	—
4	d, e, f	Maybe a symbol
5	—	A card like the one on the board
6	—	—
7	c	—
8	c	—
9	a, e	A photograph of me and my name
10	f	A cartoon like the ones we used today only it would look like you
11	c	
12	d	It would be cool [to be an alien]
13	b, c, e	
14	b, c	
15	f	Because I want you to (?)
16	b	Because it wouldn't show too much and you could make yourself look good

10. Do you like reading?

student	answer	comment
1	5	Because it's fun
2	5	Yes, because books are good to read
3	5	I like certain books because they are interesting
4	5(6)	All stories are different. There are many different types of stories
5	4	Because it educates you and it is fun
6	—	—
7	5	Because it's interesting
8	5	—
9	5	It is fun to see what peeps like
10	4	There are good books
11	5	Because it is interesting
12	5	Reading is fun
13	5	I love to read but only good books
14	5	It increases diction, fills time and occupies my mind
15	5	Yes
16	3-4	Sometimes, it's really if I like the story

11. Do you like using the computer ?

student	answer	comment
1	5	Because it's fun
2	5	I like to use the computer because it is fun
3	5	Because it is easy to use
4	2	I don't have a very good computer and I don't really use it a lot
5	5	Yes, because you can do anything on it
6	—	—
7	5	I don't know
8	5	I love going on chat rooms
9	5	It is fun to go on msn and the Internet
10	5	I always use the computer, I like the interactivity
11	1	Because it kills brain cells
12	5	I like typing
13	1	Not fun
14	1	[he corrects the question: "Do you like using Internet?"] Too much spam, weird stuff, things
15	5	Yes
16	4	Only if it is working

12. Would you talk to kids from other places in a reading club on the Internet?

student	answer	comment
1	Yes	
2	Yes	Yes, I would talk to other kids
3	Yes	So I could meet more people
4	Yes	It's fun. You can get to know different people and their opinions
5	Yes	Because it is fun
6	—	—
7	Yes	Because it's interesting
8	Yes	Because I like learning about different cultures
9	Yes	It would be fun to see what it is like there
10	Yes	It would be fun to know what other kids thought of the book
11	No	Because I don't like the computer
12	Yes	It would be fun to learn how they live
13	No	Because I hated reading club
14	Yes	The weird things and viruses on the Internet don't exactly make me feel secure. I'd participate in class
15	Yes	I don't know
16	Yes/No	As long as they don't know too much about me

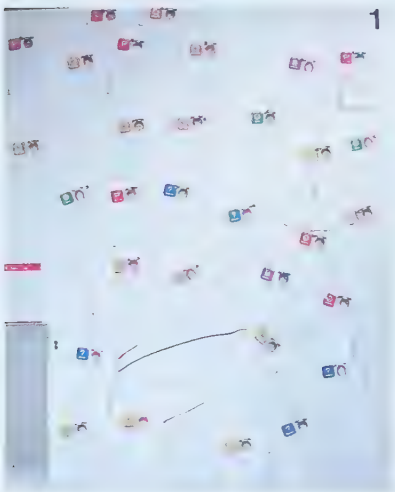
13. Do you participate in clubs online, forums, chat rooms, etc. ?

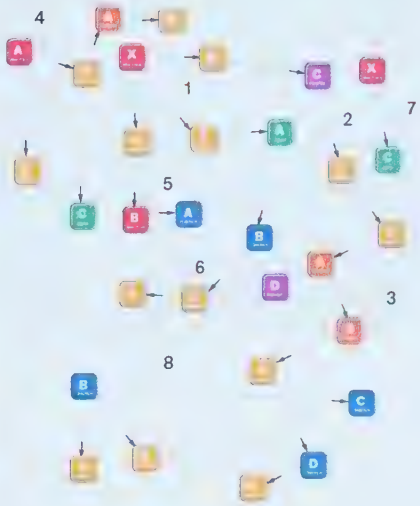
student	answer	comment
1	No	
2	No	
3	No	
4	No	I don't because I do not know of any and I don't have internet or web. I just don't use the computer a lot
5	No	Because I don't know what's on them
6	—	—
7	No	My mom won't let me
8	Yes	CHAT ROOMS!!!
9	Yes	Chat rooms, msn, and clubs online
10	Yes	I use Msn Messenger lots and play multiplayer games
11	No	
12	No	
13	No	
14	No	["No!!!!"] The weird things and viruses on the Internet don't exactly make me feel secure. I'd participate in class
15	Yes	[circle "forums"]
16	No	I don't like to share info on line

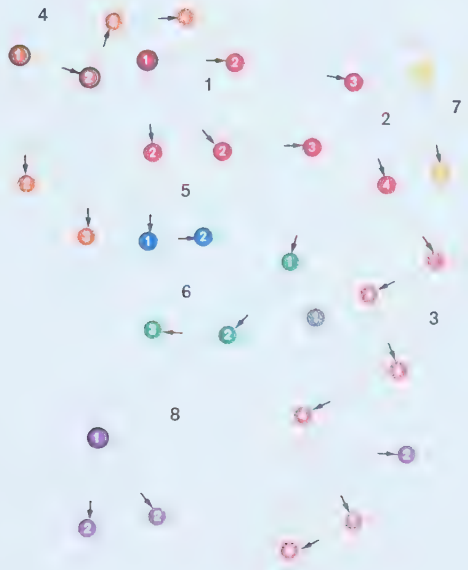
14. Do you have a computer with Internet connection at home?

student	answer	comment
1	Yes	
2	Yes	
3	Yes	(It has a virus at the moment)
4	No	
5	Yes	
6	—	—
7	Yes	
8	Yes	
9	Yes	
10	Yes	
11	Yes	
12	Yes	
13	Yes	
14	Yes	
15	Yes	
16	Yes	

Discussion boards







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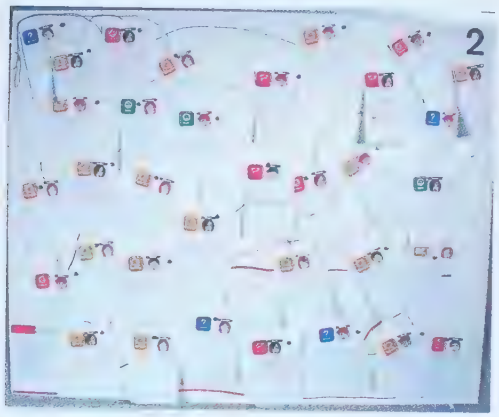

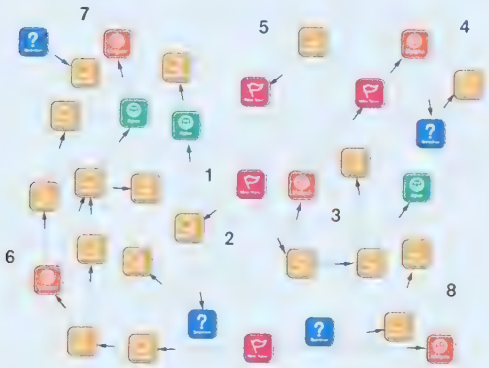

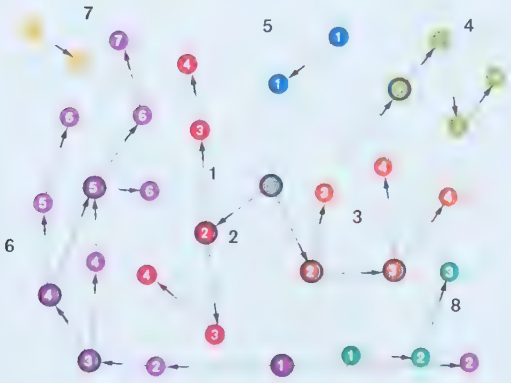

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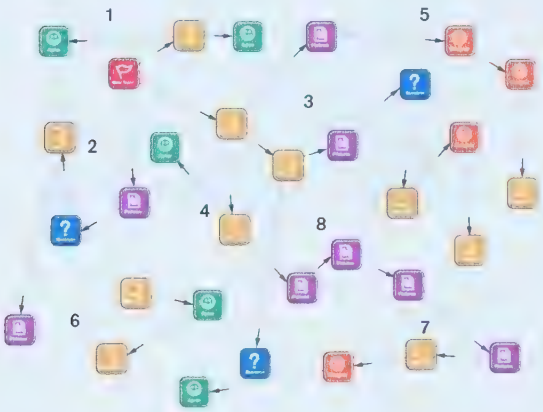

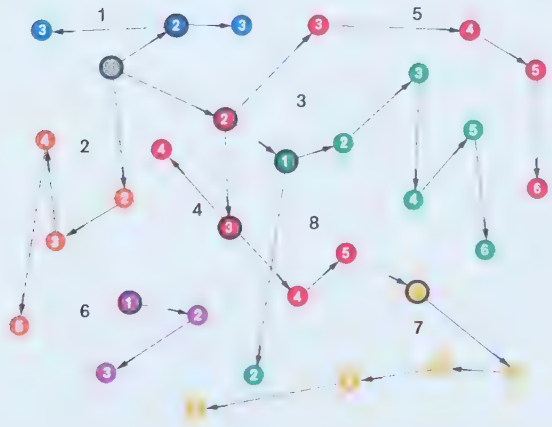

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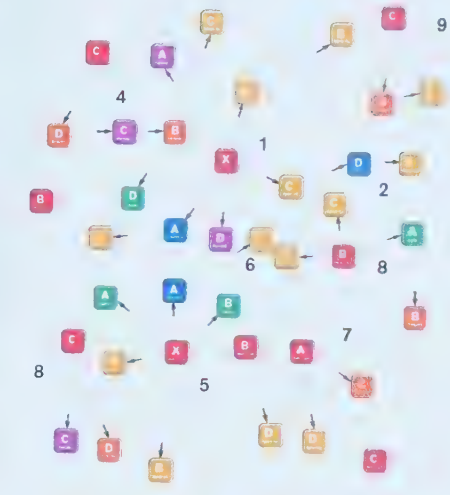

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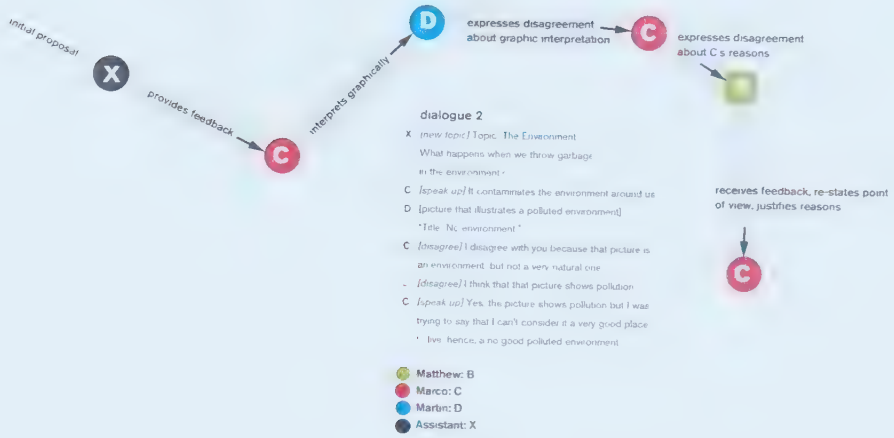
Examples of dialogue analysis



Dialogues

Group 1

dialogue 1

Erik [new topic]: Topic: Environment. What happens when we throw garbage in the environment?
Marco [speak up]: It poisons the plants and animals and kills them.
Martin [speak up]: It pollutes animals and ecosystems.
Chris [speak up]: It makes the place smell really bad and it isn't peaceful anymore. It's also bad for animals.
Marco [agree]: I agree because it sounds right and because you hear about pollution all the time.

dialogue 2

Frances [picture] I drew a picture showing what will happen if we throw garbage in the environment.
Marco [speak up]: I think your picture is very cool and realistic.

dialogue 3

Marco [speak up]: I think your picture is very cool and 'realistick'.
Chris [speak up] You spelt 'realistik' wrong Marco.
Marco [disagree] What I meant by 'realistick' was that that is what really happens.
Chris [disagree] You still spelt it wrong.
Marco [speak up] You'spellt', 'spellt', 'spett'...
Chris [question] What does 'spett' mean?
Marco [speak up] 'Beats' me.

dialogue 4

Marco [new topic] I think it's cool how fast they became friends. What do you think?
Martin [speak up] I thought it was great that they spent the whole summer at that creek.
Chris [speak up] I think that's sort of weird. I don't think anyone would become friends so fast.
Frances [agree] I agree, I thought it was very quick even if it was a short story.

Marco [disagree] I disagree. I've got to be friends that quickly.
Chris [speak up] In one minute?

dialogue 5
Martin [new topic] What's your favorite part in our ecosystem project Marco?
Marco [question] Do you mean in school or in the book Martin?

dialogue 6
Martin [question] How long did it take them to clean up the stream?
Frances [speak up] I think it was the whole summer.
Martin [speak up] Thanks Frances.

dialogue 7
Erik [new topic] Topic: Cooperation. Angie says that two cand do a lot more than one. What do you think of this? Do you agree? Why?
Frances [agree] I agree with Angie. For example, let's say you were trying to move a table or whatever. If you tried to do it yourself it could take a while. But if someone helped you it would get done faster.

dialogue 8
Martin [question] What were the character's names?
Martin [speak up] Can someone answer my question?
Marco [speak up] The girl's name was Angie but I don't know the boy's name.
Frances [question] What was the boy's name in the story?

Group 2

dialogue 1
Erik [new topic] Topic: Environment. What happens when we throw garbage in the environment?
Maria [speak up] We make it a dirty place to live and kills our water and fresh air.
Martin [agree] I agree. We should be more environmentally friendly.

dialogue 2

Maria [speak up] We make it a dirty place to live and kills our water and fresh air.
Frances [question] How does it?
Dong [speak up] It pollutes the environment with gas and items that have been thrown in it.

dialogue 3

Erik [new topic] Topic: Environment. What happens when we throw garbage in the environment?
Frances [speak up] It kills part of the environment.
Dong [speak up] I think it harms wild life and the environment
Maria [agree] It must be!
Martin [speak up] It pollutes the environment which can kill animals and make life hard for us.

dialogue 4

Maria [new topic] What is up with the whole dead fish?
Martin [disagree] I don't know.
Maria [speak up] Don't you think they would have known if the fish were dead right away?
Martin [question] What do you mean?

dialogue 5

Martin [speak up] What are we talking about?
Martin [new topic] Let's talk about something else other than who was talking!

dialogue 6

Maria [new topic] I found it hard to know who was talking, did you?
Dong [disagree] I found it easy. I imagined them with their different words and vocabulary, plus the story said who was talking.
Frances [speak up] What do you mean?
Maria [speak up] Like when Jim was talking I did not know if it was him or Angie.
Frances [speak up] Now I get it!

Martin [disagree] I thought it was an easy story to read.
Frances [speak up] What?
Martin [speak up] I understood the story well.
Maria [speak up] I thought it was easy, but I just didn't know who was talking!
Frances [agree] Ya!
Maria [disagree] I don't think you do! Or just don't get what I said.

dialogue 7
Dong [question] Where did the story take place?
Maria [speak up] In the creek.

dialogue 8
Martin [question] What did you think of the story?
Martin [speak up] No one answered my question.
Frances [speak up] I thougt it was too short and did not explain lots of stuff. I also found it boring.

dialogue 9
Martin [new topic] Back to the environment!
Frances [disagree] No way!!!!!
Maria [speak up] OK, so put us back on topic.
Martin [new topic] The new topic is Water life.
Maria [speak up]: No!!!!
Martin [picture of fishes] But it will be fun!

Group 3

dialogue 1
Carolyn [new topic] Topic: The Environment. What happens when we throw garbage in the environment?
Mariana [speak up] It destroys animal, homes and destroys places that could be used for other things
Marco [agree] I agree with you because if the environment was clean, we could maybe, swim in more lakes, or fish more.
Matthew [agree] I agree because pollution is a very bad thing and it kills living things.

dialogue 2

Carolyn [new topic] Topic: The Environment. What happens when we throw garbage in the environment?
Matthew [picture that illustrates "Garbage Creek" polluted]
Mariana [question] How can we solve this problems?
Matthew [speak up] I think we could fix these problems by making signs and cleaning the creek at least once a week.
Mariana [picture] Like this?

dialogue 3

Marco [speak up] It doesn't take too much garbage to contaminate a river.
Martin [question] How much garbage would it take to keep fish out of a river?
Marco [picture that illustrates a "good" and a "bad" environment]
Matthew [question] Why do people throw garbage into the creek?
Marco [speak up] Because they thought if other people's garbage was there, it was ok to throw it in.
Mariana [disagree] How did the problem started then?
Marco [speak up] It started with one person throwing something in the creek in purpose or accidentally. Then somebody saw him do it and they thought it was ok. And so on and so forth.

dialogue 4

Carolyn [new topic] Topic: The Environment. What happens when we throw garbage in the environment?
Marco [speak up] It contaminates the environment around us.
Martin [speak up] Factories and machines like cars, trains, jets and boats pollute the environment as well as garbage.
Mariana [agree] And some make roads and wipe it completely!

dialogue 5

Martin [picture that illustrates a polluted environment] "Title: No environment."
Marco [disagree] I disagree with you because that picture is an environment, but not a very natural one.

Matthew [disagree] I think that that picture shows pollution.
Marco [speak up] Yes, the picture shows pollution but I was trying to say that I can't consider it a very good place to live, hence, a no good polluted environment.

dialogue 6
Matthew [speak up] I think that people can be really pollutive to the environment.
Martin [agree] I agree with protecting the environment because we would have cleaner lakes, rivers, oceans, cities, etc., and we might live longer.
Mariana [speak up] Not only in rivers do people pollute, but everywhere! Help out and put it in trash cans.

dialogue 7
Martin [picture that illustrates the contrast between a clean and a polluted environment]
Matthew [picture that shows a $50.00 fine applied to someone that threw garbage in the environment, and a big garbage bin]
Matthew [speak up] I think that we should have more garbage cans and bigger fines. Does anyone agree?
Marco [disagree] I disagree because if we don't fine them, what's to stop them from doing it again? I think there should be something more than just a fine.
Matthew [agree] I agree. There should be more than a fine.

Group 4

dialogue 1
Erik: [new topic] Topic: The Environment. What happens when we throw garbage in the environment?
Matthew:[speak up] The animals no longer consider it clean and possibly may leave.
Hyun: [question] Why do people pollute?
Connie: [speak up] Because people are not smart.
Chris: [picture that illustrates someone throwing garbage] Text: "Bad!"

dialogue 2

Erik: [new topic] Topic: The Environment. What happens when we throw garbage in the environment?
Marco: [speak up] The environment gets polluted and animals may die.
Chris: [question] How will garbage kill animals?
Connie: [speak up] Garbage will kill animals if the eat it.

dialogue 3

Matthew: [new topic] Story structure and the mechanics. How did you think the story structure was?
Marco: [speak up] I thougth it was pretty good.
Hyun: [agree] I think the story structure was a good story structure.
Matthew: [disagree] I disagree because I think they became friends to quickly.
Matthew: [speak up] I don't quite think that the story mechanics were all that strong. I've definitely seen better story lines.

dialogue 4

Marco: [new topic] Topic: Colorado vs. St. Louis hockey series. Who do you think will win?
Chris: [disagree] Stay on topic.
Marco: [a picture of a hockey game]
Matthew: [disagree] Marco, this is not a chat room. It is an online reading club.
Chris: [agree] Ya Marco, stay on topic.
Marco: [speak up] So what. I don't care.

dialogue 5

Erik: [new topic] Topic: Cooperation. Angie says that two can do a lot more than one. What do you think of this? Do you agree? Why?
Matthew: [agree] I agree because when you work with company it's a lot more fun.
Hyun: [agree] I agree that two can do a lot more than one because you can get things done faster and it is more fun working with someone else.

Chris: [speak up] Because there are more peeps you get more ideas.
Matthew: [speak up] People don't cooperate very well sometimes. But other times we cooperate because we need help.

dialogue 6
Hyun: [question] Why do people cooperate?
Connie: [speak up] Cooperation means to work together.
Hyun: [agree] I agree that cooperation means to work together.

dialogue 7
Hyun: [new topic] Healthy lunches. What do you think should be in a healthy lunch?
Marco [disagree] I think students should have the freedom to choose what they eat at lunch.
Chris: [speak up] I think it would be a good idea.

dialogue 8
Marco: [new topic] Topic: Pizza. ummm yummy!
Marco: [picture of a pizza]
Chris: [disagree] Marco!!!

dialogue 9
Marco: [new topic] Topic: Spider man. He is so cool!
Chris: [disagree] Marco stop now!!!
Marco: [speak up] Sorry!

Group 5

dialogue 1
Carolyn [new topic] Topic: Environment. What happens when we throw garbage in the environment?
Karel [speak up] It pollutes things, and animals can die. In the story Garbage Creek salmon went away because of the pollution.
Mariana [speak up] The environment, if you throw garbage in it, then it all eventually dies.
Dong [picture of a person throwing garbage in a trash can] This is what we should do.

Mariana [disagree] Yes, that is a good idea, but what happens when all that garbage piles up? it gets to be another environmental issue.
Karel [disagree] Very true Dong, but what happens when the garbage cans overflow?
Hyun [speak up] People should RECYCLE!
Mariana [agree] I agree!

dialogue 2
Hyun [speak up] I thought the story garbage creek was boring. It was too short!
Mariana [speak up] I agree with you that it was too short. But it was an interesting story.
Hyun [agree] It was educational.

dialogue 3
Karel [new topic] What about those arrowheads that Angie was collecting?
Mariana [speak up] I liked that part of the book.
Hyun [speak up] I liked the the part about the swans.

dialogue 4
Dong [question] How do animals die?
Mariana [speak up] Same way people die...

dialogue 5
Karel [question] What is a salt chuck? Do you know?
Mariana [speak up] I think is a place with salt
Hyun [speak up] I think it is a kind of fish.
Mariana [disagree] I don't think so because they were talking about arrowheads.

dialogue 6
Mariana [new topic] Why do you think the two fishes who laid the eggs died after a while?
Karel [speak up] I'm not sure. Maybe they were old, or maybe they just died of being... sick?

dialogue 7

Carolyn [new topic] Topic: Friendship. How did Angie and Jim become friends? What do they have in common?

Hyun [speak up] They both wanted to help the environment.

Karel [speak up] Angie and Jim both had very busy lives.

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